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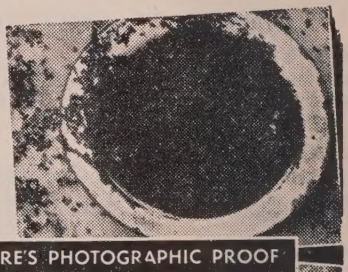

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In selecting Merino ewes it is more profitable to cull the less fertile animals than to cull those with poor quality wool. Face cover and wrinkle are both strongly associated with fertility; it is worth culling ewes with an excess of either and aiming for plain-bodied, open-faced flocks

SELECTING AND CULLING SHEEP FLOCKS

By H. E. FELS, B.Sc. (Agric.) Hons., Research Officer, Animal Division

SHEEP flocks are culled and selected for two main reasons—firstly to get immediate improvements in the present generation and secondly, to improve future generations.

Under the Australian system of sheep breeding, genetic improvement is left almost entirely to the studs. If a flock owner wants his next crop of lambs to be better than their mothers, he must try to procure rams which are genetically better than his own sheep. This is much more effective than culling the worst ewes, because the culling rate in ewes is too low to give a substantial genetic change. For the most part genetic changes and improvements must be got through the rams.

Wether flocks are culled only to remove the less profitable animals so that they will not reduce average flock production figures during their lifetime.

It would be quite realistic to use the same approach to ewe culling, that is, to ignore genetic aspects and cull simply to remove the less profitable animals. There would be some genetic gain, but I suggest that ewe culling will be more useful if its main aim is to improve the profitability of the ewe flock during its own lifetime.

This means that there should be special emphasis on fertility, since fertility is especially important in deciding how profitable a ewe flock will be.

CULLING RATES

The number of young sheep to be culled will depend on the number available, that is, lambing percentage, and also on death rates, the number of sheep to be culled for age, and whether the owner intends to enlarge his flock or not.

Table I presents three typical cases:

In Flock I fertility is poor (60 per cent. lambs marked) and only 17 per cent. of the maiden ewes can be culled.

In Flock II fertility is quite good and 37 per cent. of the maidens can be culled.

In Flock III the owner is trying to enlarge his flock and so, despite good fertility, he cannot cull any maidens.

Obviously, culling rates will vary tremendously from farm to farm, depending on the individual policy.

This article is intended for farmers who can cull only 10 per cent. of their maidens, as well as for those who can cull 40 or 50 per cent.

TABLE I.—CULLING RATES—THREE TYPICAL CASES

	Flock I	Flock II	Flock III
Present flock size	1,000	1,000	1,000
Desired flock size	1,000	1,000	1,150
Lambing percentage	60%	80%	80%
Maiden Ewes available	300	400	400
Replacement Ewes needed—			
Deaths	50	50	50
Age culls	200	200	200
Flock expansion	....	....	150
Total Replacements	250	250	400
Number of maiden ewes culled	50	150	None
Culling rate	17%	37%	Nil

HOW TO CULL MAIDEN EWES

CULLING POINT 1.—FACE COVER

Face cover is strongly related to fertility in ewes. In general, the more wool there is on ewes' faces the less fertile they will be.

In observations on a flock at Bolgart a few years ago, Mr. H. G. Neil of the Department of Agriculture, Moora, found that only 58 per cent. of the muffled-faced ewes lambed, whereas 84 per cent. of the more open-faced ewes in the same flock lambed.

This year similar observations were made on a Corriedale flock at Quairading .

The flock was run through a three-way drafting race about a week before lambing and divided into "muffled-faced," "intermediate," and "open-faced" groups for lambing.

The 335 "muffled-faced" ewes had wool on their noses with a groove in the wool in front of each eye.

These produced only 52 per cent. lambs marked.

The "intermediate" flock of 277 ewes were a great deal more fertile, producing 70 per cent. lambs marked.

The "open-faced" group of 108 ewes were slightly better again, producing 78 per cent. lambs marked.

It would probably not be worth culling the "intermediate" types of ewe, but obviously the covered-faced types as shown in the first two diagrams (scores 4 and 5) ought to be culled as maidens. Some flocks have a high proportion of this type of sheep, and in these cases face-cover could be made the main culling point for ewes.

In the past many farmers and stud men have culled their open-faced sheep in the belief that animals with wool cover on the face and points grow more wool.

In fact, this type of sheep grows no more wool, on average, than the bare-faced type. There are differences between flocks, and especially between breeds, but within a flock there is no association between face cover and fleece weight.

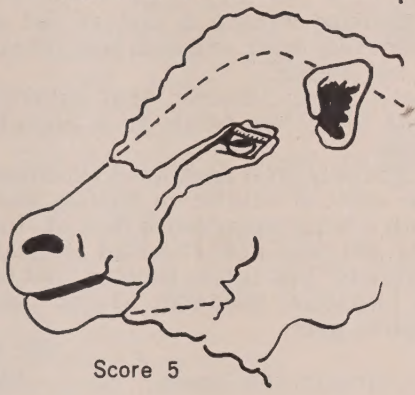
Sceptics should try weighing a number of fleeces from their own flocks; it will soon become apparent that it is unfair to cull bare-faced sheep on suspicion that they are poor wool producers.

The West Australian observations are nothing new. They merely confirm observations which have been made in New Zealand with Romneys, Corriedales

An extreme example of face cover

Diagrams for the Allotment of Face Cover Scores

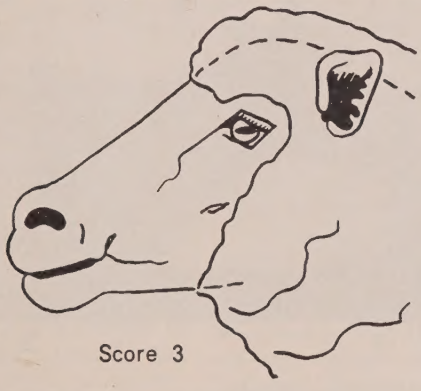
MUFFLE FACED – 52 per cent. lambs marked



Score 5

Score 4

INTERMEDIATE – 70 per cent. lambs marked



Score 3

OPEN FACED – 78 per cent. lambs marked

Score 2

Score 1

and Southdowns; in New South Wales with Merinos; in Canada with Shropshires, and in the United States with Columbia and Targhee sheep and (for good measure) Angora goats.

In all cases the open-faced animals have been more fertile, and in many cases they have lost less lambs and their lambs have grown faster. Of special interest to woolgrowers and Merino studbreeders is the fact that their average wool production has been the same as for more covered-faced sheep in the same flocks.

It is not known why open-faced sheep are more fertile. It is certainly not due to woolblindness or any effect of the wool itself, as experiments have been done with flocks that were crutched and wigged every few months, as well as with covered-faced sheep which were actually woolblind. In the Bolgart and Quairading experiments the sheep had short wool at mating time and all the woolblind ewes were wigged at crutching time.

CULLING POINT 2.—WRINKLE

Extreme wrinkle is just as bad as extreme face cover, and once again the reason is not known.

It is clear, however, that wrinkly ewes tend to be less fertile than plain-bodied ewes.

The only West Australian experiment on the effect of wrinkle on fertility was done with a fairly plain-bodied flock at Jingalup. The 920 ewes were classified as "plain" or "wrinkly" just before lambing, and lambed in separate paddocks. Lamb marking figures were:

	Per Cent.
"Plain" (467 ewes)	78.5
"Wrinkly" (453 ewes)	61.5

Standard pictures for the allotment of scores for wrinkling and folding of the skin of the neck. In the Jingalup experiment the plain bodied ewes had scores of about 2, whereas the "wrinkly" ewes had scores of about 3, with some 4

(Pictures from C.S.I.R.O. Leaflet No. 13—Selecting Merino Sheep.)

The "plain" ewes in this experiment had small straight dewlaps, and a few had a little neck wrinkle. The "wrinkly" ewes had wrinkly necks and their dewlaps were more developed, but not to the extent of being folded. Thus, even the "wrinkly" ewes in this experiment were fairly plain by Great Southern flock standards.

The average greasy fleeceweight of wrinkly sheep is often a little greater than the average of plainer sheep in the same flock. This difference is largely nullified by poorer clean-scoured yields in wool from wrinkly sheep.

As in the case of face-cover, it is a serious mistake to cull plainer-bodied sheep on suspicion that they are poor wool producers, and it is worse to select especially wrinkly rams on the assumption that they have heavy fleeceweights.

It is probably not worth culling intermediate degrees of wrinkle, but where neck development is so great that there are neck folds instead of just a dewlap, culling is warranted.

CULLING POINT 3.—FLEECEWEIGHT

Many flocks have only a few animals with face cover or wrinkle bad enough to warrant culling. In these cases fleeceweight should be the main culling point. There will also be many flock owners who will remain sceptical about face-cover and wrinkle, and I suggest that they could cull on fleeceweight.

It is just as easy to weigh the fleeces of all maiden ewes as to "class" them in the usual way. Three special points of organisation are:—

(1) The young ewes must be run as a single flock from weaning until the two-tooth shearing.

(2) They should have numbered eartags, and

(3) An extra shedhand is required for every two or three shearers while the maiden ewes are being shorn.

The extra shedhand reads the eartag number of each sheep while it is being shorn, and writes it on a card which he drops on the floor. When the fleece has been shorn he picks it up in the usual way (but more carefully, to make throwing easy) and also picks up the card and the belly. He places the fleece and belly on the scales and writes the weight on the card, and then picks up the fleece and throws it. If comments about the wool are required, the card is handed to the classer who will usually only write on it if the wool is badly "off-type."

The sheep with lighest fleeces can then be culled at leisure.

It will be found in practice that a fair proportion of the runts and "generally undesirable" animals will be culled for low fleeceweights; others can be culled if their fleeceweights are rather poor.

By culling the poor wool-producers as two-tooths the owner can be confident that he has removed animals which, for the most part, would have been poor wool producers throughout their life. He also makes some genetic progress.

CULLING POINT 4.—WOOL QUALITY

Wool quality seems to be far more important to the farmer's pride than its financial value warrants. Economically speaking it is best to cull mainly for fertility and weight of wool produced.

It was suggested earlier that the woolclasser's comments could be written on the fleece weighing cards whenever he encountered a conspicuously poor fleece.

As well as hairiness, character, count and feel, the classer should pay attention to clean-scoured yield when writing these comments.

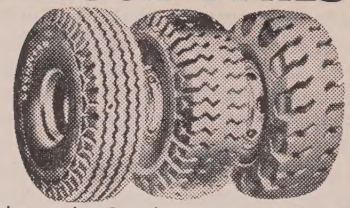
After shearing, the farmer can decide whether or not to keep these producers of off-type wool; some of them will have inferior fleeceweights and these should certainly be culled. Whether he culls all of them will depend on his pride in wool quality.

GENERAL PHILOSOPHY—CULLING MAIDEN EWES

It is thoroughly established that extremely wrinkly or woolly-faced ewes are sure to be inferior lamb producers throughout their lifetimes. If they are culled the ewe flock will become more fertile and hence more profitable.

It would probably be a good thing to have open-faced plain-bodied flocks, but culling of intermediate-type ewes to achieve this is not warranted. The obvious way to make this change is by replacing

TRUCK TYRES



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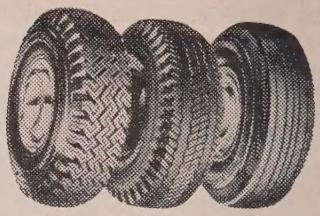

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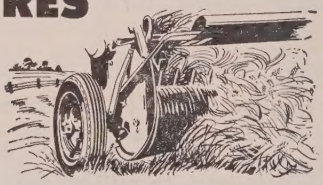

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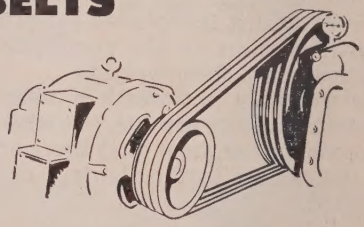

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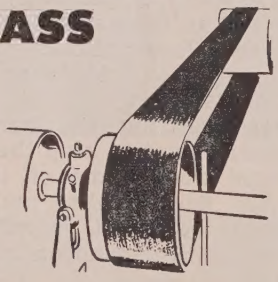

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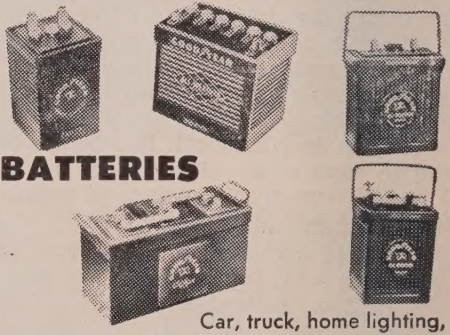

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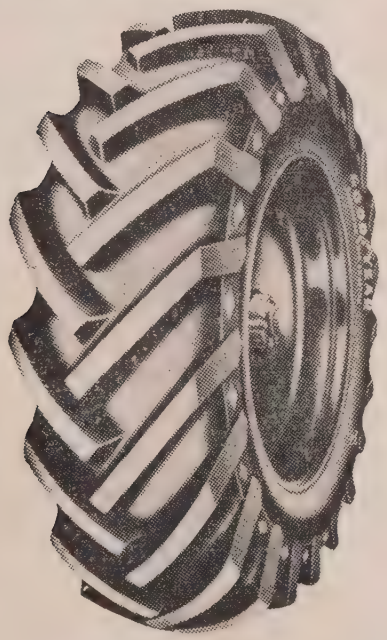

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the more wrinkly and muffled rams with more open and plain types.

Culling young ewes in the normal way involves a good deal of work and effort. Fleeceweighing would be no more difficult, and face-cover and wrinkle are easily assessed off-shears

Many flock owners will only cull a few maiden ewes for face cover and wrinkle, either because their flocks are good in these respects or because they do not believe that face-cover and wrinkle are important. In either case, the obvious main culling point would be fleeceweight.

The next point for culling is wool quality, and it is suggested that only sheep which produce badly "off-type" fleeces should be culled for this.

Culling all the stronger-woolled ewes is a difficult way to develop a finer-quality woolclip; if the changeover is really worthwhile it is easier to achieve it by changing the rams.

Jaws, hocks and conformation have not been mentioned so far.

It seems fair to assume that any important faults of this type would reduce two-tooth fleeceweight so that these animals will be culled as poor wool producers. However, it may be worthwhile to mouth the two-tooth ewes and cull any with extremely overshot or undershot jaws; this would certainly be worth doing in flocks with a high incidence of this deformity.

CASTING FOR AGE

Most flock-owners have an established system of age-culling which seems quite satisfactory.

In the harsher pastoral areas, most sheep are allowed to die on the property; this is logical where there is no market for old sheep and where lambing percentages are low. In the outer wheatbelt many farmers sell their aged ewes when their front teeth start to fall out, but most sheep in the farming areas are cast for age a year earlier than this and realise about £1 a head more when sold.

Many properties in the Great Southern and other improved pasture areas are grossly understocked. Stocking rates have only been doubled where they could have been quadrupled as pastures have improved. In these cases it is important to increase flock size, which means there can be no culling of maiden ewes. It may be a proposition to keep old ewes a year or two longer than usual on these properties.

CULLING OTHER EWES

Because most farmers do not have a great number of young replacement ewes available every year, it is rather unusual to cull many ewes of intermediate ages.

There will be some ewes that are obviously unable to rear a lamb. These include the odd ewe with both teats shorn off or with mastitis lumps in both sides of the udder. These ewes, and also injured animals, are obviously worth culling.

Some farmers with high lambing percentages cull ewes that have been dry for two years in succession. This is quite impracticable in flocks with poor lambing results because these flocks will not have enough maiden ewes to replace the "double-dry" culls. In very fertile flocks double-dry culling is practicable and may be worthwhile. Its main aim is to remove the one or two per cent. of ewes that are

permanently sterile, and its disadvantage is that a number of normal ewes are removed as well.

In the special case of clover disease, double-dry culling is more reasonable and it may be necessary to purchase large numbers of replacement ewes anyway.

Clover disease will be discussed in a later article.

Some farmers may be in a position to cull heavily, either because of high fertility or because a bad season makes them decide to reduce numbers. These farmers could cull all the extremely wrinkled or muffled-faced ewes in the flock, all the ewes with injured udders (one teat shorn off, or mastitis), or off-type fleeces. An alternative plan would be to cast-for-age earlier than usual in the hope of getting a better price.

CULLING YOUNG WETHERS

The obvious way to remove the least profitable wethers is to cull the two-tooth wethers for fleeceweight. As in the case of young ewes, they would need to be run as one mob from weaning until two-tooth shearing, and they would have to be ear-tagged with numbered tags. Shearing shed procedures would be the same as for maiden ewes.

There is no reason for culling wethers for face cover or wrinkle. As in the case of ewes, however, off-type fleeces could be culled.

If culling rates were going to be low, say 10 per cent. or so, the work of fleece-weighing may not be warranted and the runts and obvious culls could be found by rapid inspection.

However, if the culling rate was going to be high, say 30 to 50 per cent., fleece-weighing would be profitable.

SELECTING RAMS

The aim of ram selection is to change or improve the next generation of sheep as wool producers and also as lamb producers.

Important points for ram-buyers to keep in mind are:

(a) Try to buy from a stud that takes fleece weighing seriously.

(b) Reject rams with covered faces or heavy fold development.

(c) If they are available, try to get fairly open-faced rams with fairly plain bodies.

(d) Try to get wool quality and crimp up to your usual standard.

It is probably not worth paying big money for *exceptional* style and character in rams' wool.

(e) Reject any ram with serious or mild deformities (especially jaws).

(f) Reject any animal which seems to be a poor wool-producer.

It is very difficult and perhaps impossible to judge this; important points to consider are staple length and wool density, also greasiness.

(g) Palpate testes.

(h) Make sure that the animals are healthy.

IN BRIEF

- Young wethers should be culled mainly to remove the poor wool producers. This can be done by weighing their fleeces; off-type wool noticed by the woolclasser may also be a culling point.
- Rams should be selected with the main aim of making future generations of sheep more profitable. Prettiness is not very important.
- Maiden ewes should be culled mainly to remove the individuals which will be less profitable during their lifetimes. The main points are fertility (face-cover and wrinkle) and wool production (fleeceweights).
- Age-culling procedures used in Western Australia seem generally satisfactory. If an owner wants to expand his flock, he may find it worthwhile to keep his ewes longer than usual.
- Ewes of intermediate age may be culled for udder injuries and mastitis. If enough replacement ewes are avaliable, double-dry culling or other procedures to remove unprofitable ewes may be practicable.

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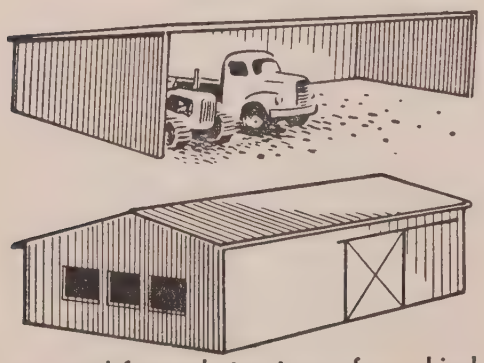

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Why Poor Prices for Pigs?

A rapid increase in pig numbers and an unfavourable export situation have precipitated the present depression in the pig industry. Concentration on quality production and a gradual reduction in numbers should bring back a more stable situation, says Dairy Division pig specialist ***P. Beck.***

Big fluctuations in the pig population—the basic cause of cycles of boom and depression in the industry—would be avoided if more farmers adopted a fixed farm level policy towards the industry.

IN an attempt to arrive at some of the reasons for the depression the pig industry is now experiencing in Western Australia, it is necessary firstly to look at the pig population statistics released for the period concerned and to compare them with those released in the preceding period.

In doing so, it must be realised that the industry in this State is divided fairly sharply into two major categories:

- Pigs raised in the grain producing areas where they are in a large majority of cases treated only as a sideline, and
- Pigs raised in the butterfat areas where they are considered an important feature in the farm economy.

From this point of view the distribution of the pig population and its fluctuations within the areas which comprise these categories, must be considered a very important factor when trends in the industry are studied.

The pig population of this State for the Statistical year ended March 31, 1960, was 130,933. Of this total some 91,128 pigs, or 69 per cent. of the total, were situated in the Northern, Central and Southern Agricultural Divisions—the major grain producing areas. Of the remainder, 20,473 were situated in the main dairying areas, 12,740 in the Swan Division and the balance in the Metropolitan and North-West areas.

The corresponding figures released this year have shown quite a remarkable increase. In fact the total pig population now of 175,675 is the second highest ever recorded, being exceeded only by the 1940 total of 217,910, and is 44,742 head above the previous year's figure.

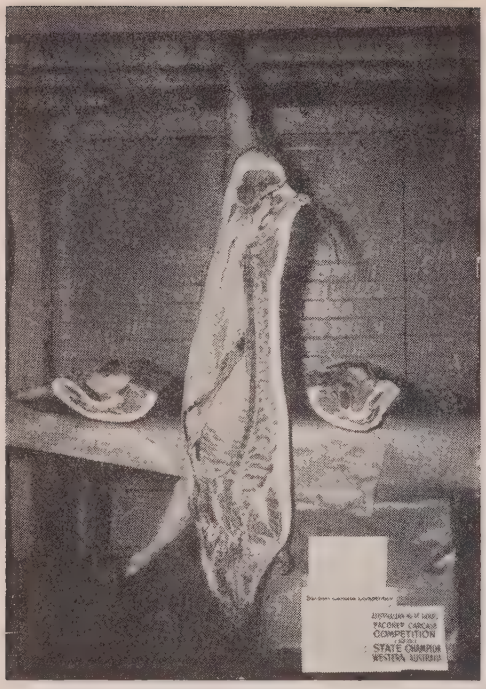
An interesting feature of this is that more than 35,000, or 78 per cent. of the increase occurred in the grain producing areas which now have approximately 71 per cent. of the total pig numbers. In the dairying areas the numbers increased to 25,253 and in the Swan Division to 16,537, with the balance in the Metropolitan and North-West areas.

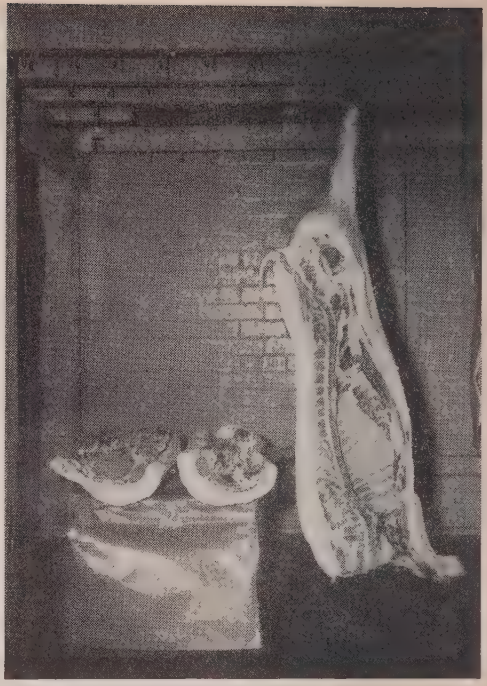
It is also worth while noting that pig numbers have increased from 115,446 in 1959 by over one third to the present total of 175,675.

With the advent of the rapidly expanded pig population in Western Australia and the overall recent increase of 13.5 per cent. in pig numbers in Australia, the balance of exports, particularly from Western Australia to other Australian States has been adversely affected, and with this, so has the price structure at the producers' level. The West Australian export trade to the Eastern States during the July-September period was down on the corresponding period in 1960.

It is likely also that consumption of pigmeat all over Australia has been affected to a degree by the low price of lamb meat.

Just how prolonged the depressed State of the industry will be is difficult to determine. However, a gradual reduction in numbers whilst concentrating on quality production would be the pig raisers' best means of returning the industry to a more stable situation. Any drastic and rapid





Quality should be the keynote in the West Australian pig industry. High quality carcasses like that on the left help maintain a more stable price for pigs, and gain a good reputation on our important export markets. Poor quality overfat carcasses like that on the right can only depress prices and give our pigmeat a poor reputation.

Pig raisers should have no difficulty in producing quality carcasses if they use good animals of recognised breeds, and follow the recommended feeding practices.

decrease in numbers at this stage would be unwise; it could quite feasibly upset the balance of supply in the next 12 to 18 months, and in doing so, the price structure could also become disproportionate, thus favouring the onset of another situation such as the pig industry is now experiencing.

Pig raisers must take a realistic attitude towards the industry if they are to help themselves to maintain a more stable production rate. The immense fluctuations in the pig population are entirely the result of the majority of producers having no fixed farm level policy towards the industry, which undoubtedly is a lucrative one if approached with the idea that what is good for the industry is reflected on to the producer.

It would also be as well to remember that the reputation of West Australian pigmeats both on the local and export market will have a great bearing on the well being of the pig industry in the State.

FARMERS

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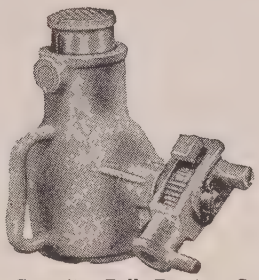

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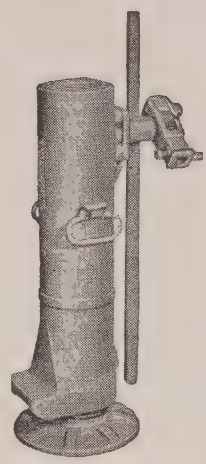

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Good Pasture on a

The acid peaty sands of the South-West have always been problem soils, and are often considered useless. But, by following recommended establishment methods, farmers like Mr. F. E. Bellanger, of Nornalup, have shown that it can carry valuable pasture.

● *Left: Mr. Bellanger shows the depth and density of pasture produced*

By R. SPRIVULIS, B.Sc. (Agric.), Dairying Division, Denmark

IN recent years several farmers have established good pastures on soils related to the Plantagenet peaty sand series. This has been achieved with initial lime dressings of one ton an acre and liberal application of superphosphate, copper and zinc on a well prepared seedbed.

Mr. F. E. Bellanger pioneered this work at Nornalup, following the experimental results obtained at Denmark Research Station and in 1956 established 18 acres of pasture on Plantagenet peaty sand. An excellent pasture resulted in the first year and a highly productive stand has been maintained since then.

Plantagenet peaty sand is a podsolic soil of restricted drainage particularly in winter, and is one of the series occurring on the south coast between Cape Leeuwin and Albany. It is a strongly acid soil, with pH values often as low as 4.0.

The profile of Plantagenet peaty sand has been described by Hosking and Burvill as follows:

			Horizon
Black	1 in.	Peaty Sand	A_0
Grey-black to grey	17 in.	Sand with organic matter	A_1
Light grey to white with brown staining	51 in.	Sand	A_2
Dark brown	66 in.	Sand-soft coffee rock	B_1
White with brown staining	84 in.	Gritty Sand	C
Black	....	Cemented layer	B_1

(C.S.I.R.O. Bulletin No. 115, 1938.

The depth of A_0 horizon can vary and is related to drainage and severity and frequency of bushfires.

The native vegetation on Plantagenet peaty sand series is characterised by bottlebrush, tea-tree, kangaroo grass, and small rushes. Stunted trees may also occur in varying numbers; these are jarrah, blackbutt, swamp banksia and paperbark.

In some areas these soils remain moist at the surface in summer; in others the surface dries out.

Soils retaining moisture near the surface for the best part of summer are more successful for establishment of productive perennial pasture species. Mr. Bellanger's successful pasture establishment and management on such soil is of great interest.

Treatment and Production in 1960

A paddock consisting of 18 acres of fifth year pasture and six acres of second year pasture was stocked until the second week in March. It was then topdressed with 1½ bags of cobalt superphosphate and 1 cwt. of muriate of potash per acre. Strip grazing of the area by a herd of 22 cows started on May 15 and continued for 15 weeks, allowing a half-acre strip each day.

Problem Soil

●*Right: Native vegetation—scrub, rushes, and stunted trees*

With very little supplementary feeding the average production of the herd per cow per day was:

May: 1.5 lb. butterfat.
June: 1.8 lb. butterfat.
July: 1.6 lb. butterfat.
August: 1.7 lb. butterfat.

This paddock was closed at the end of August, and cut for silage and hay in October. It then yielded 40 tons of silage and 15 tons of excellent quality hay. During December it was again lightly grazed for two weeks by the same herd.

Establishment and Management up to 1960

The paddock was originally sown in the autumn of 1956 with a seed mixture of:

Yarloop Subterranean clover 10 lb. per acre.
Mt. Barker Subterranean clover 10 lb. per acre.
N.Z. Perennial Rye Grass 4½ lb. per acre.
Paspalum dilatatum 4 lb. per acre.

. . . and small quantities of Red clover, N.Z. White clover and *Lotus major*.

This was sown into a well prepared, moist seedbed.

Before planting, lime sand (containing 50 per cent. calcium carbonate) was applied at the rate of two tons an acre and incorporated into the soil by disc-cultivation to a depth of four inches.

After several harrowings, the above seed mixture, with all legume seed inoculated, was broadcast with copper-zinc superphosphate at the rate of two bags an acre. This was followed by another harrowing.

A good pasture stand resulted, and was grazed in the first year. This excellent pasture has been under heavy rationed grazing since, except for six acres cut for silage and hay in 1959.

Annual fertiliser treatment has consisted of autumn top-dressing with superphosphate at two bags an acre.

Potassium deficiency became evident in the fourth year and the amount in one bag an acre of super-potash maintenance mixture was not sufficient to rectify it. Muriate of potash was applied at 1 cwt. per acre in 1960, and gave good results.

Bulrushes appeared in the second year and were eradicated by digging up the individual plants.

Under those conditions Yarloop subterranean clover, New Zealand White clover, and perennial ryegrass have performed well, and have given good production. The other sown species have either died out, or play only a minor part in the pasture production.

ACKNOWLEDGMENTS

Acknowledgment is made to the Agrostologist, Mr. F. E. Ryan for his suggestions, and to Mr. F. E. Bellanger for his co-operation in the grazing management in 1960, and for the establishment and production details.

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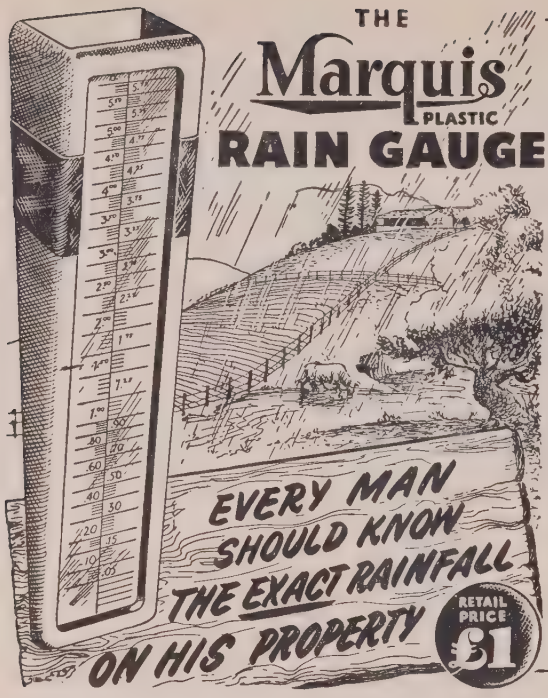

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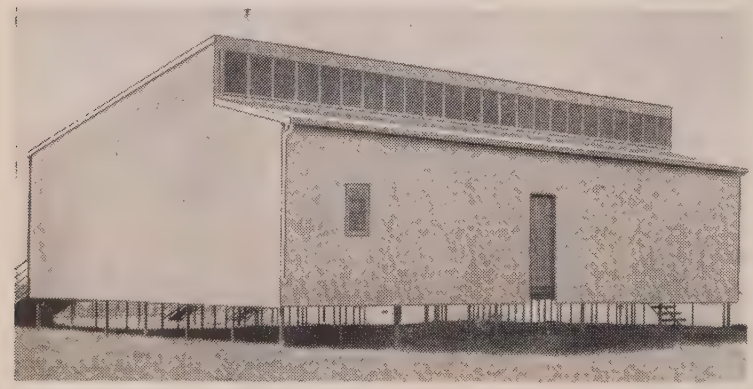

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RUST OF SNAPDRAGONS

By OLGA M. GOSS, Plant Pathologist

RUST caused by the fungus *Puccinia antirrhini* is possibly the most destructive disease attacking antirrhinums or snapdragons. In Western Australia, the disease first appeared in 1955 and since that time has become very prevalent and widespread, frequently with devastating effects.

The fungus attacks plants at any stage of growth—leaves, stems, buds and occasionally seed pods being subject to infection.

The rust usually appears first on the leaves and later spreads to all other above ground parts. It first becomes obvious by the development of light coloured raised spots, which, within a few days, break open to expose dusty brown to black masses of spores. On the leaves, the pustules are frequently circularly grouped, but on the stem they are elongated (see Figs. 1 and 2). Severe attacks kill the plants rapidly, while milder attacks disfigure the plants and reduce their vigour.

Development of the disease depends to a great extent on weather conditions. It is most likely to occur during spring and autumn, when cool morning temperatures are followed by warm days, especially when the leaves are moist with rain or dew. Hot dry conditions do not favour disease development.

Initial infection and spread from plant to plant is mainly by wind. By this means, transport for considerable distances can occur. Even if a first planting of snapdragons is being made in an isolated area, it is still possible for the disease to develop. Evidence of the rapidity of spread by wind is shown by the fact that the disease was first recorded in Australia in New South Wales late in 1952. Within two and a half years it had spread to every State in the Commonwealth and New Zealand.

Fig. 1.—View of section of diseased plant showing leaf and stem lesions. Note the rounded lesions particularly on the undersides of the leaves and the elongated stem lesions

CONTROL

(1) Once established, the disease is difficult to control. For this reason

prevention should be attempted by regular weekly applications of either zineb or sulphur—containing sprays or dusts.

(2) Where treatment has been neglected and plants become severely affected, the only remedy is to pull up and burn all severely diseased plants.

(3) If available, use a resistant variety. Some progress has been made overseas in the breeding of resistant varieties and some of these may prove satisfactory under local conditions.

(4) If any plants are found to be free of the disease in a badly diseased planting, save seed from these for future plantings as they may have some resistance.

Fig. 2.—Close up of separate leaves showing the rust pustules concentrically arranged

COVER PICTURE

PAW-PAW — TROPICAL FRUIT WITH A FUTURE

Our cover picture shows a good specimen of paw-paw growing on the Department of Agriculture's Gascoyne Research Station at Carnarvon. Paw-paw, one of the best and most popular of the tropical fruits, has so far been grown only on a minor scale in Western Australia, but it now looks to have a bright future in the Carnarvon district.

Demand for the versatile paw-paw is growing as city people get to know it and appreciate its qualities. Planters along the Gascoyne River can grow plenty of good quality paw-paws, but so far the problem has been to get them to the southern market in good condition. Being large and soft they are not easy to pack and transport, and the 600-mile journey to Perth has so far prevented the market from being developed to any extent.

For the past nine years, trials have been in progress at the Gascoyne Research Station on a number of selected lines of varieties imported from Queensland. Their main aim has been to find a high quality variety which will stand the journey in good condition. Good progress has been reported; some of the varieties are much better than varieties first tested, although they could be better yet.

Most promising of those under test is Guinea Gold, a bisexual variety (most paw-paws are monosexual, each tree having either male or female flowers, but not both) which is described as a good firm carrying variety with an excellent flavour. It also colours up well before going soft, which gives it another advantage over most other varieties.

Recent shipments of this variety have been well received, giving promise of future commercial production.

Packing techniques are also being improved, and the result of these trials should be an increasing flow of paw-paws from Carnarvon.

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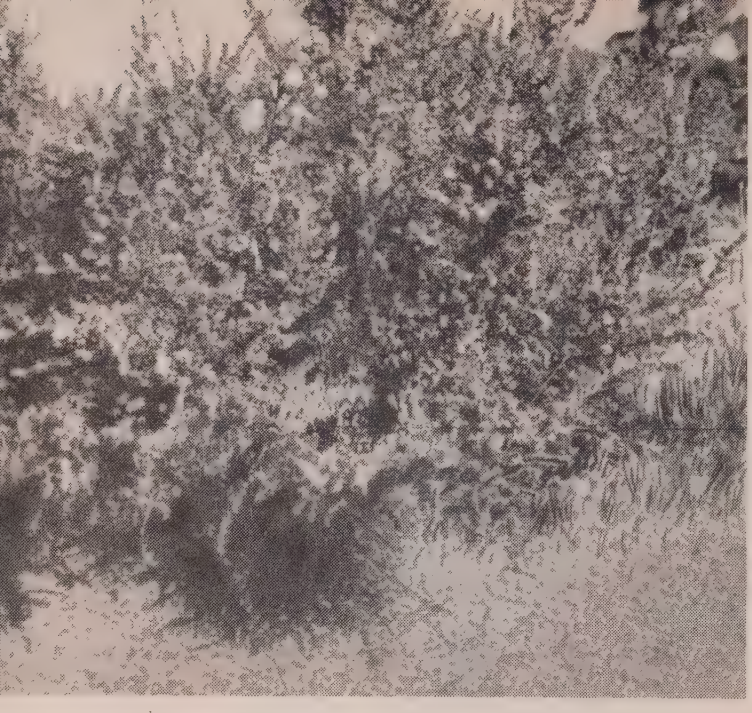

Bluebush seeds most heavily in February-April. This is a close-up of a bush laden with flowers and ripe seeds.

Reclaim Salty Soils with B

BLUEBUSH (Kochia brevifolia) is an Australian plant which can produce good yields of excellent feed when grown on well drained salty soils in the 12 to 15-inch rainfall districts of Western Australia.

From salty soils which are unreliable for cereals or annual pastures, bluebush will yield annually at least 5 cwt. per acre of material containing over 20 per cent. protein, and this is available in summer and autumn when it is most needed.

Bluebushes produce seed in abundance, but seed may also be purchased from some stock firms. Establishment from seed is sometimes poor, but fortunately the young bushes seed in the first year and good natural spread occurs with a little encouragement and protection.

The seeds of bluebush are about as big and as heavy as a piece of tissue paper the size of a threepenny piece. They ripen on the bush and may easily be dislodged by wind or sheep.

Since the seeds are so light they flutter on the slightest breeze and are moved around until they strike some obstruction. Unfortunately most salt-affected soils are very smooth and windswept and provide very poor catching ground for windblown seeds.

Several different cultivation methods may be used for seed trapping, and so long as a rough surface is provided the method used is not important. Roughening may be carried out in summer or winter.

Seeds may also be trapped in hay, sticks, or brush.

These pictures show how you can encourage the rapid spread of bluebush on salt-affected land.

The seeds, which are almost black when mature, are shed in great numbers. They are very light and blow until they lodge against some obstruction. Here seed has been shaken onto the ground near a bush

Bluebush

Remains of baled hay left by sheep fed on this bare salt area have caught bluebush seed. A good growth of seedlings can be seen in the hay in the foreground and middle distance. The area was protected from grazing

The light papery seeds may be caught in furrows. These lines of bluebush grew from seed which blew across the bare salty soil, and caught in the furrows. The area was not grazed

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"ALONG THE TRACK WITH CROSBIE MORRISON"

THIS book consists of a series of nature talks by the late Crosbie Morrison, selected and edited by his wife, Lucy Morrison.

As a popular writer and broadcaster on natural history Crosbie Morrison filled a unique role not only in his home state of Victoria but throughout Australia and beyond.

In 1938 he began a series of broadcasts from a Melbourne station which continued weekly for 20 years. Within months of commencing these talks the session attracted 70 per cent. of the local listeners and by 1944 they were being heard from 40 stations throughout Australia. For several years Morrison also edited a natural history journal called "Wild Life" and a miscellaneous section headed "Along the Track," which no doubt inspired the title of the present book.

Morrison's scientific training as a biologist, together with his professional experience in journalism, provided a rare combination of talent which enabled him to present authentic scientific material in a manner which interested laymen and naturalists alike. The thousands of friends who listened regularly to nature talks on Sunday evening will regain some of that earlier pleasure as they browse through this volume, which by design of the editor, has retained the original conversational and intimate style so characteristic of all Morrison's work.

The book opens with a chapter on Living Fossils, in which the habits of Australia's unique egg-laying mammals, the Platypus and the Echidna are briefly described. The ways of bats and flying foxes are then treated, followed by an interesting summary of Australia's tree climbers. These include of course the well known Koalas and possums and the lesser known gliders or so called flying squirrels.

Birds are given due prominence in the book, for Morrison was a keen ornithologist, and at the time of his death was just completing a revision of the late Dr. Leache's famous publication "An Australian Bird Book."

Bird migration, nesting habits, the cuckoo problem and the ways of the blue wren are some of the items touched upon in a manner which will both instruct and entertain. Even snails and earthworms have a place, and if you didn't know before, you can learn from this book that the giant earthworm of Gippsland may stretch to a length of 10 ft. Two brass tacks 10 ft. apart in a desk used by Morrison at the Melbourne University testify to the truth of this statement.

Two chapters deal with different types of plants, one with the mushrooms, ferns, lichens and other lowly groups, while the other touches briefly on the orchids, gum-trees and honeydews. We are also reminded that tea-trees were once actually used by Captain Cook to brew tea, and that the spelling "ti" is therefore quite wrong.

Dealing with the sea and its shore Morrison touches on sharks, bony fishes and whales. He also describes the habits of the bluebottle, jelly fish and the pearly nautilus.

The book ends with some interesting comments on spiders moths and bees and an account of those noisy summer musicians the cicadas.

It is unfortunate that presumably, considerations of cost limited the number of illustrations which have been reproduced, for Crosbie Morrison was an accomplished photographer and had worked in most parts of Australia. The single colour block

and eleven black and white pictures add greatly to the interest of the book as do the numerous sketches by Anne Lissenden.

"Along the Track with Crosbie Morrison" is in no sense a text book nor a complete reference work, but it contains much valuable and interesting information on many facets of Australian wild life. It can be read at a sitting or in small doses and will be welcomed not only by the naturalist and nature lover but by the general reader who has the faintest interest in the world around him.

"Along the Track with Crosbie Morrison": A selection from his nature talks by Lucy Morrison, Whitcomb and Tombs. Melbourne, 1961.—30s.

—C. F. H. JENKINS.

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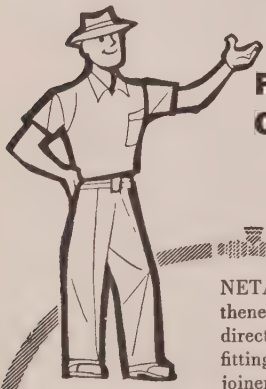

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Avoid Losses from . . .

POISON PLANTS

Farmers in "Poison" districts can avoid serious stock losses if they can recognise dangerous poison plants, and have a knowledge of how the concentrations of toxic substances in these plants change with the seasons.

In this article, R. D. Royce, Officer in Charge of the Botany Branch, outlines the principles involved.

EVERY country in the world has its poisonous plant problems, but in Western Australia we have more than our share.

Few agricultural districts are free of these dangerous plants, and some districts are so well supplied that their development has been considerably retarded. Today however, a number of these areas are being opened up for settlement, so that the problem of the poisonous plant is just as pressing as it ever was.

Toxic species are to be found in most plant families, from the algae to the daisies, and it is understandable therefore, that it is not possible to recognise all toxic plants by one or even by a series of physical characters. Even the great plant families themselves are hard enough to differentiate, and plants from a number of families have little in common.

RECOGNITION

In the South-West of Western Australia, the great majority of the native toxic species are members of the pea-flowered group of the legumes. All have flowers which are structually the same as the field pea, tree lucerne or the clovers. The size and colour of the flowers differ, but they are always unmistakably pea-shaped.

Most of these are species of either *Gastrolobium* or *Oxylobium*. Plants such as York Road and Champion Bay poisons are species of *Gastrolobium*, while box, granite and net-leaved poisons are included in the genus *Oxylobium*.

These plants are closely related and therefore have quite a number of botanical characters in common. Thus in the flowering season it is comparatively easy to arrive at a fairly reliable decision on the possible toxicity of any pea-flowered plant.

At other times of the year, however, it is not nearly so easy and a number of dangerous species cannot always be distinguished from plants which are completely harmless.

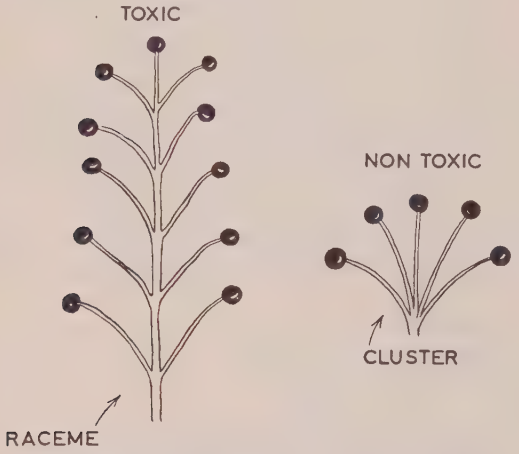
Flower Arrangement:

The most important of these characters is the arrangement of the flowers on their stems.

In all toxic plants the flowers are borne on special leafless branchlets and not on the main stem. These branchlets may be produced at the apex of the leafy stem so that the flowers are carried beyond the leaves, or they may arise from the angle between the leaves and the stem. In either case there are no leaves on the branchlets, and after flowering and the shedding of the seed the branchlet itself dries up and falls from the stem.

In non-toxic plants on the other hand, the flowers are borne on the main leafy

stems and the stalk of each individual flower arises from the stem at the point where a leaf has already developed. Thus the flowers are not on a special branchlet but are amongst the leaves and arise from the main branches.



Typical flower arrangements of toxic and non-toxic plants. In all toxic plants the flowers are borne on special leafless branchlets and not on the main stem

Any plant which carries its flowers on special leafless branchlets may be toxic, but it must be remembered that many a harmless plant has the same floral arrangement, while any pea-flowered plant which bears its flowers among the leaves and on the main stem can not be toxic.

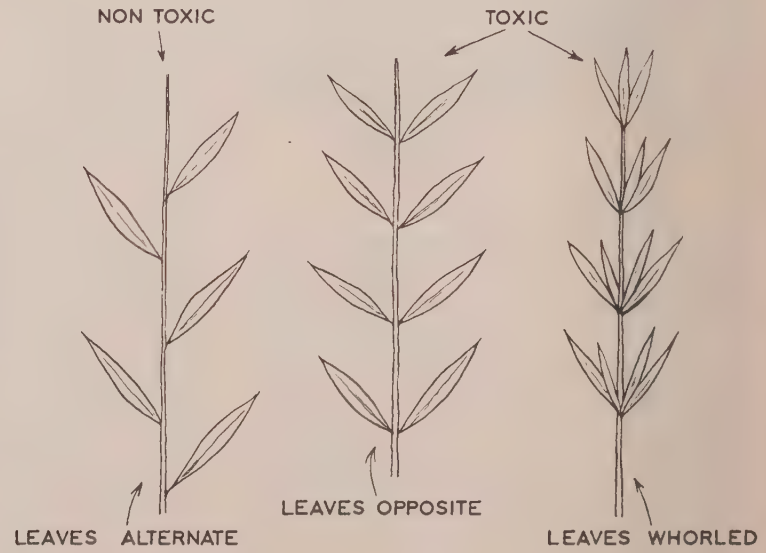
Leaf Arrangement:

Leaf arrangement is also important, and this is one of the best known characteristics of toxic species.

The leaves are either opposite, as in the majority of species, or in threes, as in such plants as sandplain poison, while in river poison they are in clusters of four. This statement is correct for the great majority of plants, but in some species, as for example box poison, the leaves may be scattered along the stem and not arranged in any particular order. Again in Phillips River poison, the leaves are so crowded together that no grouping is apparent.

Stipules:

The third and probably the most difficult character to observe is the presence of stipules at the base of the leaves. These stipules are small structures arising from the stem at each side of the point of union of the leaf stalk with the stem. They may be fine and hairlike as in Champion Bay poison and in the majority of the other species, broad and flat as in gilbernine poison or stout and spinescent as in York Road poison. They sometimes fall off as

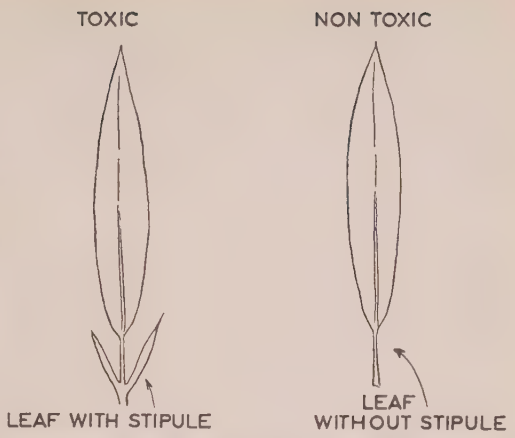


Poison plants have their leaves opposite, with leaves arising in pairs, or in groups of three or four, arising from the same level. Sometimes the leaves are scattered on the stem or are densely crowded. Alternate leaf arrangement is not found in toxic plants

the leaf matures, but in all toxic species they can be seen towards the apex of the stem among the young leaves.

These three characteristics, then, serve to identify a toxic species among the native pea-flowered plants, and from the practical point of view a knowledge of them is most important.

Where sheep are being lost, or better still before sheep are turned in to graze, the paddock should be closely inspected, and if any plants having flowers on special leafless branchlets, with opposite leaves and stipules, are to be found in the area, specimens of these should be forwarded for identification to the Botany Branch, Department of Agriculture, South Perth.



Poison plants carry stipules at the bases of their leaves. These take a variety of forms and are often hard to recognise

VARIATIONS IN TOXICITY OF POISON PLANTS

TOXIC PLANTS fall into two groups—those which are toxic only under certain conditions, and those which are always toxic.

The first type, examples of which are plants which produce prussic acid, are dangerous only under certain circumstances, and as a rule, only for short periods. At other times these plants are harmless and are even regarded as good pasture or fodder species. They are not usually of great significance as poisonous plants, but when stock losses do occur, they may be both sudden and severe.

The second group consists of those plants in which a toxic principle is constantly present in the plant tissues, and the plants are therefore always dangerous. To this group belong all the really serious toxic species, including the many *Oxylobiums* and *Gastrolobiums,* of this State. These are of tremendous economic importance to farmers and graziers in nearly all the agricultural and pastoral areas of the State, and particularly in those areas where new land is being opened up.

In Western Australia the term "poisonous plant" tends to be synonymous, in popular usage, with the many pea flowered species of *Gastrolobium* and *Oxylobium* such as York Road poison, box poison and many others. These plants have been responsible for very serious stock losses, and although deaths are known to have occurred at all seasons of the year, they are more numerous in the spring and early summer than at other times.

This has lead to the recognition of the fact that there is a certain variation in the concentration of the toxic substance in the plant tissues. It has been found that there are three levels of toxicity in these plants.

Late Summer

The first and the least toxic stage is during the late summer and early autumn months. Plant growth at that time is stagnant, the leaves are harsh and dry, and the plants are relatively unpalatable. Nevertheless they are still toxic and if eaten in sufficient quantity can cause losses.

New Growth

With the advent of growing conditions in late autumn the toxic plants, in common with many other species both native and introduced, put out fresh shoots. In most cases these are soft succulent growths and are quite attractive to stock. As a

result of the activity within the plants in producing the new growth, the toxic principle in the tissues increases, so that the new season's shoots are both more palatable and more toxic. Similarly young seedling growth is usually more dangerous than the over-summering leaves. This is the second level of toxicity.

Flowering Stage

Growth continues during the late winter and spring months until the flowering. Meanwhile, the build up in the toxic principle runs parallel with plant growth, and reaches its peak at the stage of full flowering. Thus in September and October the plants have reached both their most palatable stage and their most toxic stage. At this time they are capable of causing very heavy losses, and it is fortunate that at this season they are also most easily recognised. During the setting of seed after the flowers have faded the toxicity remains high, and it is only after the dispersal of the seeds in December, that the third and most dangerous level of toxicity gives way rather rapidly to the less dangerous summer resting stage.

The plants have then gone through a complete cycle of toxicity, and the variations exhibited throughout the year are of considerable practical importance. The summer period is regarded by many farmers as being relatively safe for grazing bush paddocks containing a little poison, particularly such relatively harmless species as prickly poison. But even here grave danger can exist, and the cause of it is the summer thunderstorm.

Summer Thunderstorms

The sudden and plentiful supply of moisture in the soil produces a rapid and phenomenal increase in the toxic substance, so that within the space of a few hours the plants become as dangerous as during the flowering period. Even prickly poison under these conditions becomes as toxic as the other species, and has been known to cause very heavy losses.

Toxic plants serve no useful purpose on a farming property and should be eradicated. But while the eradication programme is being carried out, poison country should be handled with care, and stock should not be grazed in paddocks containing toxic species during the flowering season, while in the summer period, if a thunderstorm appears to be imminent stock should be immediately moved into a safe paddock.

—from an A.B.C. Radio Series

ARREST THOSE SPARKS

Fires started by sparks from faulty spark arresters on tractors during wheat harvesting can cause heavy crop, pasture and stock losses.

"It is essential to fit an approved spark arrester," says Agricultural Engineer of the N.S.W. Department of Agriculture, Mr. J. G. Drever.

Spark arresters work under conditions of great heat, take a lot of pounding and are subjected to much vibration.

All these factors make design and manufacture difficult, and cause the arrester to wear or break down, sometimes with serious economic results.

"Do not take chances with your spark arrester.

"It is not sufficient to know that when it was first fitted it was an approved type.

"Check it regularly to make sure it is still serviceable," advised Mr. Drever.

The Australian Tractor Testing Station conducts tests on spark arresters.

Reports on these tests give a brief specification, show how they work, how constructed materials used, and analysis of the effectiveness of spark arresting and some comments on factors influencing their prospective life.

Test reports appear from time to time in the Journal of Agriculture.

Honey Flora Calendar For January

COMPILED BY R. S. COLEMAN, APICULTURAL SECTION, WITH ASSISTANCE FROM THE BOTANICAL BRANCH

Common Name	Botanical Name	Where Found	Honey		Quality of Pollen	Flowering Time	Remarks
			Quality	Quantity			
Yate	*Eucalyptus cornuta* Labill.	On the better soils in the Great Southern. Mostly cut out	Good	Good	Good	Dec., Jan.. Feb.	Is stil lworked by some beekeepers on south coast.
Sugar Gum	*Eucalyptus cladocalyx* F. Muell.	Not a native of W.A. Only where planted	Good	Good	Good	Jan.-Apl.	Where planted as street trees and shelter. Trees in the Great Southern will give 14 lb. honey for each mature tree. Flowers each year.
Chenille Honey Myrtle	*Melaleuca huegelii* Endl.	Limestone ridges of coastal plain	Medium ..	Medium ..	Good ...	Mid-Dec. to late Feb.	Widely scattered and difficult to find commercial stands, keeps the bees going when there is nothing else.
Flat-leaved Paper-bark	*Melaleuca parviflora* Lindl.	Swamps in the South-West Division	Good	Good	Good	Christmas to end of 2nd week in Jan.	This tree is noted for the abrupt finish to the flow.
Blackbutt	*Eucalyptus patens* Benth.	Widespread in wetter forest country	Good flavour but poor colour	50-70 lb. on good flow	Good	Jan.-Feb. ...	Quality differs from district to district.

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MURESK AGRICULTURAL COLLEGE

(Department of Agriculture)

Parents are reminded that applications for 1963 admission to Muresk Agricultural College close on December 31st of this year. A preliminary selection of 1963 entrants is made after the Junior results are available early in 1962.

The successful applicants then continue with Sub-Leaving, or higher studies, in 1962.

Before the course can be commenced applicants must have studied—

Junior—English; Maths. A; Maths. B; Physics and Chemistry (or Science A and B, or Gen. Science); Book-keeping; and others such as Geography.

Sub-Leaving—English; Maths. A; Physics; Chemistry and others.

Those who take Gen. Science need extra Chemistry and Physics in the following year. Some prefer to take Junior Book-keeping in the same year.

Should places still exist for 1963 commencement after the preliminary selection early in 1962, they are filled in order of application during 1962, by qualified applicants.

Duration of Course—Two years.

Fees—Approximately £190 per annum covering full residential charges.

Scholarships—Department of Agriculture (3), the "Countryman" and J. J. Poynton Memorial (2).

Boarding Allowance—Most Muresk students are eligible for the Education Department Boarding Allowance (£50 per annum).

Full details of the College are obtainable from the Principal, Muresk Agricultural College, Muresk, W.A., or the Department of Agriculture, Perth.

Bee Farming

MAINTAINING PRODUCTIVE STOCK

By R. S. COLEMAN, Officer-in-Charge, Apiculture Section

EVERY bee hive must be a productive unit, headed by a young vigorous queen, to to make sure of the greatest possible return from capital invested in the commercial apiary.

Every hive that does not produce to its maximum is a passenger on the rest of the apiary. A poor hive costs just as much to maintain and transport as a good one.

To keep these hives in full production and in good condition, it is necessary to replace at least half the queens every year with young vigorous queens of a productive strain. There are two approaches to the problem of maintaining young productive queens in the apiary—requeening at fixed intervals, or requeening according to hive performance.

A.—REQUEENING AT FIXED INTERVALS

This means replacing half the queens each year. It is effected by killing the old queen and replacing her with a new one, introducing a queen cell into the hive to be requeened, or combining with a nucleus hive.

1.—Killing the old queen and replacing with a young queen.

This method involves searching for the queen through the hive. This can be helped by puffing smoke in one side of the entrance of the hive for two to three minutes before opening the hive. The

queen is then usually found on the second deck on the side opposite to which the smoke was introduced. If the queen is not found by searching and there is no chance of coming back next day, the whole hive is shaken through a queen excluder and the queen found in this manner.

After the old queen is found and destroyed the new mated queen is introduced.

Introducing queens into productive hives can be difficult. If the queens are raised by a queen producer, they will come in a queen cage or queen bank. The queen cage has the queen and about 12 escort bees, together with the instructions on how to release her.

The queen bank has 50 or more queens in a nucleus hive, each queen in a separate cage without escorts; the free roaming worker bees in the nucleus feed and care for all the mated queens. Two dangers of queen banks are that queens are sometimes chilled when a bank is travelling in an exposed position and the bees cluster in the top of the box, and that the bees tend to abscond when released in the apiary. Absconding can be overcome by shaking young bees in front of the hive. These queens are placed in the hive to be requeened, in the same manner as the caged queen with escorts.

The candy blocking the entrance to the cage is exposed to the bees in the hive, to enable them to free the queen by eating it out after she is accepted.

2.—Cell introduction.

The second method is to introduce a queen cell in the top of the hive. When the young queen hatches she usually goes down and kills the old queen.

The cell is placed in the super of honey away from the brood nest, and as the queen seldom leaves the brood in an undisturbed hive the young queen hatches out without interference. The slow moving older queen, hampered with eggs, has little chance of defending herself against the youngster. The fault with this method is that there is a break of 10 to 14 days in egg production, and a subsequent drop in the worker population.

3.—Combining with a nucleus hive.

In the third method, a laying queen is introduced with a nucleus on the top of the hive.

This is done by making up a super containing the frames, bees and queen from the nucleus hive, filling the spare room with empty frames and placing it on the top super of the hive to be requeened. To keep the two lots of bees apart one or more sheets of newspaper are placed between these supers, making sure there is no passage-way for the two groups of bees to meet around or through the sheet of paper.

If a few small nail holes are pierced through the paper, the bees will tear the paper out overnight, and combine peaceably. One of the queens is killed, and 95 per cent. of cases it is the older queen. The hive is then strengthened by young bees and headed by a young queen.

B.—REQUEENING ACCORDING TO HIVE PERFORMANCE

The second system of requeening is to watch for hives that are failing when extracting, then at the end of the extraction round, put a nucleus with a young mated vigorous queen on the top of each failing hive.

This is the most economical way, because the hive remains a producing unit at all times and production does not fall while the young queen mates and starts to lay. Also good queens are not killed unnecessarily and are used as long as they remain productive.

With this method, the highest production is gained at the lowest cost in queens. The only drawback is that nuclei, headed by good young queens, must be carried at all times.

Breeding Stock.

The most common way for the honey producing beekeeper to secure breeding stock is to buy, from the recognised queen breeder, a queen that has been tested as a potential breeder queen.

The other way is to select a breeder queen from the hives in the apiary. This works in well with the nucleus and hive combining method of requeening.

Queens selected for breeding replacements must be high producing queens that consistently produce daughter queens which are also high producers.

Selecting the Breeder Queen.

Easy recognition is essential when testing queens as potential breeders.

It is very simple to place a dob of paint on the thorax of the mated queen bee, using one of the modern water-resisting poster paints. The queen, held by one wing, will pivot on her six legs and try to pull the wing away. While she is doing this she presents an easy target for a fine paint brush to place a small dob of paint in the middle of her thorax. It is necessary to hold the queen away from the hive for about 10 minutes until the paint has dried. She can then be returned to the hive, and the paint should remain on her back for up to four years.

If a different coloured paint is used for each year, the age of a queen can be seen at a glance when the hives are examined.

A queen that is still producing well after two years and whose daughter workers show uniform colouring, can be considered as a possible breeder queen. Docility and good comb-building in the daughter workers are also attributes to consider.

If 10 daughter queens are bred from this queen and prove to be high producers over the next year, and if the potential breeder still remains a high producer in the third year, she can be used with relative safety as a mother of replacement queens.

This marked breeder queen can be easily found because of the marking paint on the back of her thorax. She was marked 12 months before the photograph was taken

QUEEN RAISING METHODS

THERE are two main methods of raising queens, and these have one point in common: the need for a vigorous hive to feed the young queen larvae. This can be produced by upsetting the balance of the normal hive, in other words duplicating the spring condition.

The methods used to do this vary with each beekeeper, but the most popular is to introduce young bees in to a queenless hive at a constant rate.

The young bees at the age of from three to twenty days are the main suppliers of royal jelly, the "milk" of the bees secreted from glands on the forehead of the worker bee. This group of bees has a physiological urge to feed larvae and where a hive has a high proportion of this group the queen cells are large and full of royal jelly. This makes sure that young queens have the best of food during their larvae life so they will be as good as their genetic makeup will allow.

THE DOOLITTLE METHOD

THERE are many modifications to the method originated by G. M. Doolittle, about 80 years ago.

The original method is as good as any of the modifications, which only serve to meet variations in the working methods of different beekeepers. The method described below follows closely, but not exactly, the original recommendation of Doolittle in the 19th century.

Equipment Needed

Grafting tools.—There are a variety of types including the flattened end of frame wire, specially made grafting tools, a 000 paint brush, a sharpened match, and a sliver of bamboo.

Cell frames.—These are frames fitted to take cell bars.

Cell bars made from bottom bars.

Clean wax.

A one-inch paint brush to put on the wax.

Three queen excluders. These should be enough for one run, i.e., one batch of 40 cells every five days.

Boardman feeders, four for one run.

Twelve strong hives to supply the bees.

A number of nuclei stocked with bees according to the number of cells needed, or if the queens are placed out or sold as soon as they are laying the number of nuclei needed to take the cells produced in three weeks.

PREPARATION OF HIVES FOR QUEEN RAISING

The secret of queen raising after the breeding stock is selected is abundant food of the right type for the larvae. This is the one aim in preparing the hives.

For a successful queen raising project, a number of special hives should be selected and prepared. Each has is own part in the programme.

The Queen-Breeder Hive

The queen in this hive is the mother of the queens you are going to produce. From it are taken the larvae which are grafted into queen cell cups.

The larvae produced for grafting should have two characteristics:

- They should be well fed, floating in a relatively large drop of royal jelly to make the grafting easy and protect the very small larvae.
- They should be between 24 and 48 hours old.

Points to Follow:

(a) Keep the breeder queen in a single deck.

(b) Feed the hive at all times with a Boardman feeder.

(c) Have honey combs on the outside with the brood in the middle.

(d) Use dark combs for the queen to lay in so that the larvae can be easily seen.

(e) Remove the centre frame of brood and replace it with the dark drawn comb. On the morning of the seventh day, the larvae should be ready to graft, with average age of about 40 hours. The maximum age is then 60 hours and the minimum age 32 hours.

(f) It is wise to make sure of the age of larvae by lifting freshly laid eggs out after the frame has been in for 24 hours, and placing it over a queen excluder, with milky brood on each side of the eggs in a very strong hive.

Cell building hives:

Two methods are commonly used to start and finish the cells. In the first, the cells are started in one hive and finished in another; in the second both processes take place in one queenless hive.

1. A closed swarm box or an open cell starting hive accepts and starts the cells, then the cells are finished in a queen-right hive, specially strengthened with bees.

(a) *A swarm box (or closed starter)* is an enclosed box with provision for five frames, with an air space of 6 in. under the frames. The space has flywire on each side to allow free movement of air.

The box is stocked with about 3 lb. of bees or the bees that had been covering 10 frames of milky brood. In the box the frames are arranged with a frame of water on one side and a frame of honey on the other side. A centre space is left for the cell frame, and on each side of the space are frames of brood. Make sure that none of the brood is less than 3½ days old by taking the frames from a deck of brood placed above a queen excluder eight days before.

On the top of the lid of the box is provision for a bottle to feed the bees while they are confined. The lid of the bottle has some twenty holes made by a frame nail and is filled with a mixture made from ½ gal. of hot water and 6 lb. of sugar.

Just before the cells are introduced, the closed starter is dropped on one corner; this bounces the bees into one corner of the box and stops them flying out when the grafted bars are introduced. The box should be kept in a cool place and the bees should not be used more than twice before they are tipped out in front of a cell finishing hive and the box recharged with fresh bees.

(b) *The open free-flying cell starting hive* is better than the closed hive, as it is more quickly prepared and does not need specialised equipment. A strong hive has all the brood except one frame of milky brood on which is the queen, brought up above a queen excluder, and this hive is fed from this time on. Seven days later, the queen with enough bees to care for her, is removed in a nucleus hive. The nucleus hive is removed from the apiary altogether or is kept shut for two days before the bees are released. This ensures the queen retains enough bees to look after her.

The eggs and young larvae left over are placed on the top of another strong hive so that they may be cared for while the starting hive is being used. The remaining bees, together with the older brood, are left on the old site in a single deck hive, a space being left in the middle of the frames to take the cell frame.

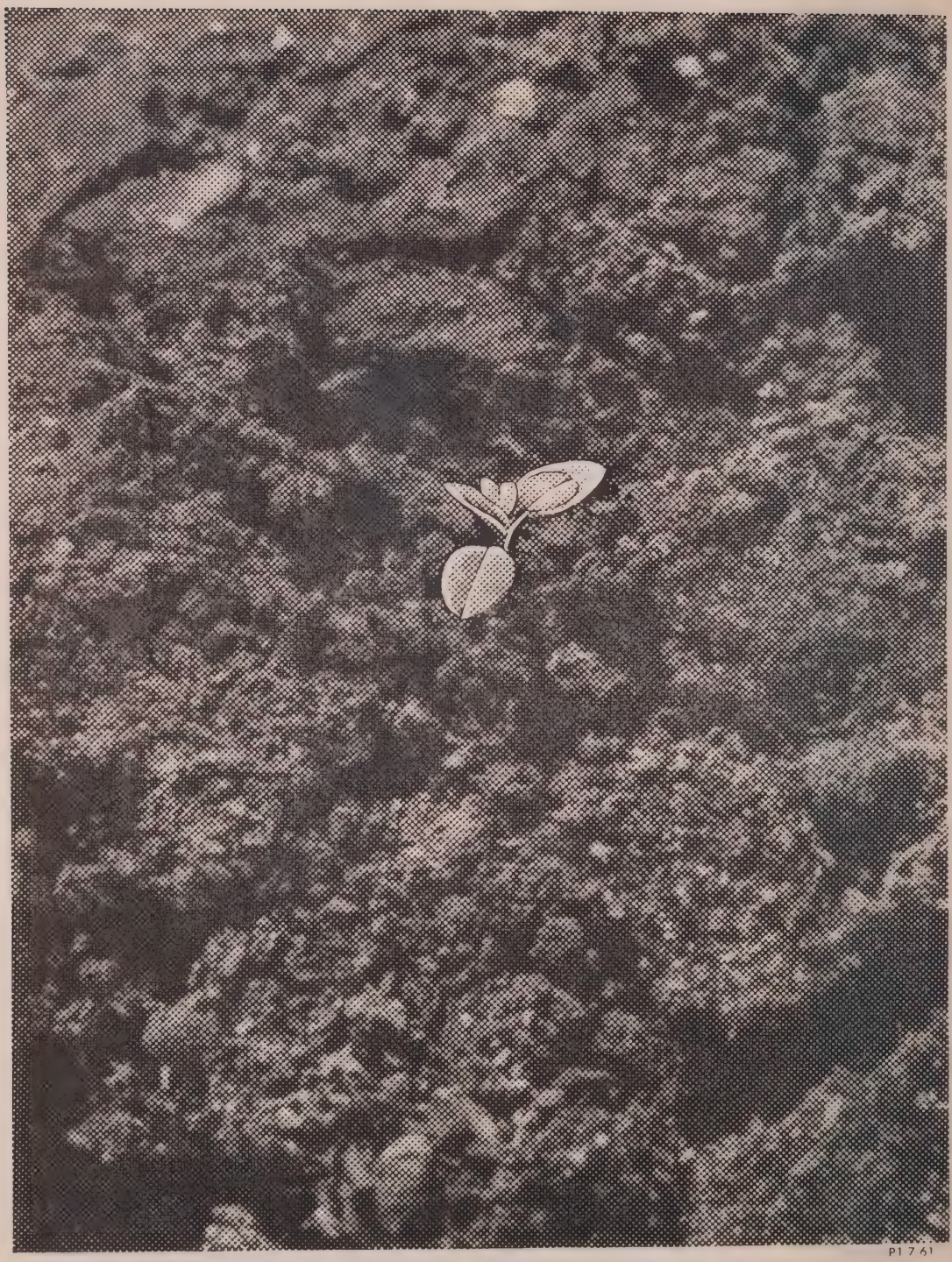
This open starter should not be used for more than five days, after which it should be recombined with paper with the young brood and queen, or strengthened with a deck of brood and young bees.

The queen-right finishing hive is a strong hive that has had added to it, over a queen excluder, a full deck of brood and bees, by the paper combining method, to give it the needed over abundance of young nurse bees to finish the cells after they are placed in the deck above the queen excluder.

All hives used in queen raising should be fed freely; this one should be fed for at least three days before it is used.

2. In the queen-less cell-raising hive method, the cells are placed in a queen-less hive after they are grafted and not

A strong open starter hive. The strength can be seen from the bees clustering in the front and on the frame containing the milky brood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TIME (AND WATER) WILL TELL!

Like this tiny plant we face a critical possibility. The Great Thirst, the dry dusty arid pinch, the crying, urgent need for water.

It may take a mere twenty years to realise this desperate situation.

Australia is developing at a tremendous rate — population increase is amongst the highest rate of any country in the world — and this is the world's driest continent. Towns will need more water. Farmers will need more water. In ten years we will need almost 50% more water — *yet our supply of water is limited.* This situation calls for increasing effort to augment supply, eliminate waste and to expand our skill and knowledge in the proper use of water.

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removed until they are ready to be placed in the nuclei.

The hive is built up the same way as the open cell starter with added bees and old brood, i.e., all larvae over four days old. If the hive is used consistently for complete cell building, a box of bees and old brood is added every five days as a batch of cells is removed.

There is a danger of laying workers appearing if the hive is used for more than three weeks, therefore only four batches of cells should be put through before the hive is given a queen. Do not give the hive a good queen, as they very often kill her.

When using queenless starter hives or queenless cell-building hives, make sure that queens flying in the area are not called into the hive by the bees, by protecting the entrance with a queen excluder. If queens do fly in, all the cells could be destroyed.

CELL CUP EQUIPMENT

Cell cups are cast wax cups, the right size for the bees to accept as their own manufacture.

Making Cell Cups

A vessel containing absolutely clean wax and rain water is heated until all the wax is melted. If a water jacketed vessel can be used, this gives better protection against the wax boiling over and starting a serious fire.

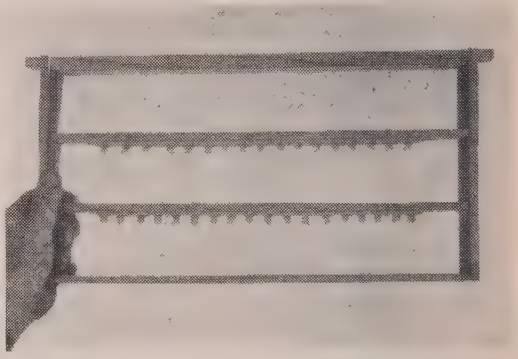
Do not have this wax too hot or cold. The aim is to get a good even cover of wax each time the cell stick is put into the wax. Experience will soon teach you the right heat.

A cell stick, usually $\frac{3}{8}$ in. dowel, is tapered from about $\frac{1}{2}$ in. from the end to finish with a rounded base. If the beekeeper who produces his own queens wishes to make his own queen cells a single stick is all that is needed.

The art of coating the wax cups is to first wash the stick in hot soapy water, followed by rinsing the shaped end in boiling water and then placing this end of the stick in iced water. [The iced water goes into the grain of the wood, making it waterlogged.]

After the stick has been shaken to remove drops of water, immerse in the wax for $\frac{3}{4}$ in.; cool the wax-covered tip in iced water and dip in the wax again for $\frac{1}{4}$ in.; remove, cool in the iced water again, dry off all water and dip a third time for $\frac{1}{8}$ in., then cool it for the last time in the iced water. The cell cup is then removed by gently twisting it off the stick.

The cell cups are fastened to the cell bar with wax, using a 1 in. pastry brush on the cell bar. Twelve to 18 cups should be evenly spaced along the bar.



Queen cell cups ready to be put into a hive for "warming up" overnight

Cell Bars

The cell bars are made from frame bottom bars. One layer of molten wax is brushed on to the surface of the bar and then allowed to become absolutely cold; a second layer is then brushed on, at least $\frac{1}{8}$ in. thick, and it is on this layer the cell cups are fastened.

When the ripe cells are removed, a 1 in. square of wax $\frac{1}{8}$ in. thick comes off easily. This square protects the cells, and gives a firm base that can be pushed into the comb of the nucleus hive when the cell is introduced. The wax square becomes part of the comb and does not have to be removed for extracting the honey.

The day before the cells are grafted, the frame containing the cell cups should be placed into a hive for the bees to tidy up. This is usually called "warming up" the queen cups.

GRAFTING

Grafting is an art that comes only after many failures. Before attempting to graft into the queen cells, it pays to experiment

Grafting young larvae into the cell cups after they have been cleaned up by the bees.

by lifting out drone larvae with the grafting tools until you have the knack of lifting the larvae without damage.

How to do it:

The first essential is to make sure the larvae are floating in a reasonable amount of milk, then take the frame to a position where you have ample light over your left shoulder (if you are right handed), hold the bar of the queen cups with your left hand, using the frame and brood in such a position that while it is not in the way, the larvae can be placed comfortably in the cell without moving the comb.

When you are comfortable, take the grafting tool and slip it down the side of the cell. Slip the end of the grafting tool underneath the larva and you will find that it can be lifted up with its two ends dangling from each side of the grafting tool. The larva is gently lowered onto the surface of the queen cell cup.

The newly-grafted larvae must be placed in the starter hive or building hive, as soon as possible. Cold does not kill the larvae but dryness, heat and sunlight do. It is important to keep the larvae in the shade and out of the wind.

Priming the cells:

Some beekeepers prime their cells with royal jelly, others with honey and others do not prime at all. Each method is well supported by numbers of beekeepers.

INTRODUCTION OF CELLS

The completed cells should be introduced into mating nuclei with as little exposure to heat and cold conditions as possible.

Normally no more than 80 cells are introduced during one day; this is equivalent to five bars of cells. If these are firmly fixed on to the cell bar, they should be cut off beforehand and placed in specially made frames and placed over a queen right colony over a queen excluder, for the bees to care for them.

On the day on which they are introduced into the nuclei the frames are carried from nucleus to hive in a small carrying box. Do not attempt to shake the bees off the frames, but rather put them all into the carrying box. These bees will try to keep the hive temperature within the box and the cells suffer less from the cold.

NOTE: It is most important that at no time should the cells be tipped more than horizontal; if they are tipped more than horizontal they may as well be discarded because the wings of the pupae will probably be damaged so that when the queens emerge they may not be able to fly, and thus become drone layers. It is also for this reason that the frames must not be bounced or dropped.

To actually introduce each cell, lift out one of the brood combs and one of the

CHART FOR RAISING QUEEN BEES BY THE DOOLITTLE METHOD

(First Run Only)

Day	
1st Day	In the morning, raise above queen excluders enough brood to make up an open-entrance starter or (alternatively) enough brood to make up a queen-less cell starter and finishing hive. In the late afternoon put a dark comb into the middle of the hive containing the breeder, making sure the frame on each side of the empty comb has plenty of milky brood.
2nd Day	In the afternoon take out the frame of newly laid eggs from the breeder hive and place it above a queen excluder between two frames containing milky brood, in a strong two-deck hive. Make sure the foster hive is fed well, as are all other hives used in the cell building.
3rd Day	Feed.
4th Day	Feed.
5th Day	Feed. **First day of second run. Other days follow same sequence as first run.**
6th Day	Eggs in foster hive should be hatched, and can be examined when the eggs from the next run are introduced and placed between two milky combs. If the early batch of eggs are not hatched discard them. The starter hive if used should be dequeened and all the milky brood removed except the brood placed above queen excluded on the first day. Another deck of old brood and attached bees should be combined on top with paper. If a queen-less cell-builder is used instead of a starter and queen-right finisher, this should have two decks of old brood combined on top. The cell bars with the attached cell cups should be placed in the cell starter or cell-builder to be warmed up.
7th Day	The first batch of larvae will be the right age to be grafted in the morning. Graft them and place in the starter or cell building hive. If a Queen right is to be used strengthen it by taking all the bees and half the brood from a strong hive and combine the bees and brood with the queen right finisher with paper. Make sure a milky comb is in the place that will be occupied by the starter cells. Make sure the queen is down in the bottom deck under a queen excluded.
8th Day	Remove grafted and started cells from the starter hive, if this was used, and place in the queen right cell finishing hive, taking out a comb from between milky frames to make room for it.
9th Day	Feed. **First day of third run. Other days follow same sequence as first run.**
10th Day	Feed.
11th Day	Feed.
12th Day	Feed.
13th Day	Feed. **First day of fourth run. Other days follow same sequence as first run.**
14th Day	Feed. Prepare nucleus hives for queens.
15th Day	Put cells into nucleus hives to hatch.
16th Day	Cells hatching.

honey combs. Take another brood frame, break down a hollow on the edge of the brood, and fix the cell in this.

The square of wax can be pushed into the comb, leaving the queen cell hanging down in the hollow scraped in the comb. Put the frame containing the cell back in the hive, put in the brood comb and ease it up to the cell, watching to make sure it is not squashed between the frames, then put in the honey comb.

It is wise to wait at least six hours after taking out the old queen before introducing the cell.

PROGRAMME FOR THE DOOLITTLE METHOD

The chart opposite shows the day-by-day programme for one queen-raising run, which takes 16 days. Most breeders would complete three or four continuous runs, each following the same sequence, once the hives had been set up. The first day of each run is noted on the chart.

It is suggested that the breeder make out a calendar from this chart, outlining the duties for each day of his queen raising project.

The programme should be followed closely; deviations can cause failure of the whole project.

THE JAY SMITH METHOD

JAY SMITH was a leading queen breeder in the U.S.A. for many years. His method is in itself an adaptation of a much older method, the Alley method.

The procedure outlined does not strictly follow Jay Smith's method.

The Jay Smith method departs in two ways from the Doolittle method:—

(1) Strips of comb are cut and very young larvae are used.

(2) To be successful it must be continuous. It is a method more suitable for a queen breeder who wants to produce 40 to 80 cells each day of the week.

Its disadvantages compared with the Doolittle method are:—

(1) The cells are usually webbed together with comb, and the walls of the actual cells are weak.

(2) It can only be used continuously.

(3) It needs more skill in management of the breeder hive.

For the commercial queen raiser, its advantages are:—

(1) The larvae are not touched.

(2) Younger larvae grow into slightly better queens.

(3) The continuous production is an advantage to the commercial queen breeder.

The method of producing the larvae is the essential difference between the two systems.

In the Jay Smith method, the queen is confined in a 10 frame single-deck hive, divided into two compartments by a wire queen excluder. One has room for three frames, and the other for five frames.

The dividing queen excluder should be cut down to fit inside the box from the bottom to level with the top. The wooden rim should make a close fit all round the box, and there must be no way the queen can get into the larger compartment.

Laid across the top so that it falls over the edge of the box by about two inches all round, and nailed to the top of the partition, is a piece of heavy canvas. It helps if a piece of wood or fibre board is fixed to each side of the canvas, to hold it down. To shelter the hive, a lid is placed over the top.

The entrance at the front of the hive, on the side of the smaller compartment, is completely closed, so the bees only have access to the smaller compartment through the queen-excluder.

In the front a one to two pint Boardman feeder filled with strong syrup is used to keep the queen laying continuously.

A drawn one-third sheet of foundation as used in the Jay Smith method. The queen can be seen in the middle of the photograph, laying on the sheet. Three days later strips of these cells are placed on cell bars

STOCKING THE JAY BREEDER

The queen is placed in the three frame compartment about a week before the eggs are needed, with three frames of brood. All the other brood is placed on the other side.

At the time when the eggs should have been laid, a drawn out one-third sheet of foundation is placed in the centre of the queen compartment, and the centre frame removed and placed on the other side.

If the hive is in correct mood, the queen will lay in a solid pattern on each side of the one-third sheet.

At the same time the next day, the one-third sheet of eggs is put in the larger compartment, against the partition. It is replaced in the queen's compartment with another drawn one-third sheet. This should be done every day; it is wise to put the one-third sheet over even if it contains no eggs.

At the end of four days, the first sheet of eggs will be hatched, and ready to be placed on the cell-bars.

If the queen is marked, it is fairly easy to see her and make sure she is not put over accidently. It pays to see her each day to make sure she is the breeder queen.

The breeder-hive constantly drops in strength, and it is essential to add bees continuously, not only when the queen needs them. A danger sign is the absence of cluster between the side of the box and the frame furthest from the queen in the queenless side. If only a few bees are there, the breeder-hive worker strength is dropping too low.

A frame of brood shaken in front of the breeder each evening, or two if the strength is going down is the best way to help the breeder.

RAISING THE CELLS

It is absolutely necessary to use a queenless hive to start the cells with the strip method.

The best method is the queenless cell-builder, although the open-queenless

The one-third sheet, when it is withdrawn from the queen right side, is covered with bees and full of eggs.

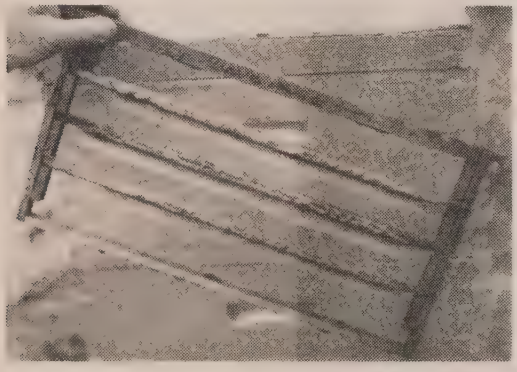
starter and queen-right finisher method is also good.

The cell builder needs to be built up with a deck of brood and bees each time cells are placed in it, and it should be fed constantly. It is the cell builder that draws out the one-third sheets of foundation.

Watch for laying workers in the queenless cell-builders and make sure there is a queen excluder across the entrance.

Fixing the strips to the cell-bars:

A one-third sheet is taken out of the breeder as the new sheet goes in. At this stage it contains hatching eggs. The bees are brushed off and the sheet laid on newspaper on a hard surface. A hot sharp knife, heated in a tin of briskly boiling water is used to cut the strips.



The frame with strips attached to the cell bars about to be placed in the cell building hive

The sheet is cut into one cell-wide strips. If the knife goes down the middle of the cells each side of the line to be retained, it keeps away from the small larvae in the middle, and kills the larvae in the side cells.

The cell bar is then brushed with molten wax, and before the wax sets the strip is gently pressed onto it. With the brush, more wax is run down each side of the strip to hold it in place.

Some of the larvae are now killed; this is necessary to space the future queen cell. A hot knife is a good implement.

At least two larvae in three should be killed. More space should be left if there is any doubt.

It is not necessary to trim the strip in any other way.

It is wise to put the freshly grafted cells or strips into the cell-builder hive in the evening, so that there is a good cluster to care for the larvae. The cell-builder hive is strengthened with a deck of brood every five days.

PROCEDURE FOR THE JAY SMITH METHOD

1st Day:

Stock the breeder-hive, and start feeding all hives.

Start cell builders. Place above queen-excluders in the hives to be used as cell-builders, all the brood except two frames of brood that are left below with the queen.

In the top deck is placed a new one-third sheet of foundation, approximately square, held in place with wires through the two bottom holes in the frame and waxed thoroughly in the top groove.

Reinforcing Hives: For continuous cell production five cell building hives are needed. To make sure they are strong enough, 10 hives, two for each cell-builder, have all the brood brought above a queen excluder except two frames of brood left with the queen. The rest of this box contains empty frames so that she will continue laying at full capacity. These hives are used to keep the cell-builders at full strength.

6th Day:

In the afternoon, start the breeder by putting a drawn one-third sheet into the queen-right compartment. Trim this sheet back to the original square shape.

7th Day:

In the afternoon put a newly drawn one-third sheet of foundation into the breeder.

8th Day:

In the afternoon put a newly drawn one-third sheet of foundation into the breeder.

9th Day:

In the afternoon put a newly drawn one-third sheet of foundation into the breeder.

Remove the queen and all the young brood and eggs from one cell-builder. Place two decks of brood and bees on top of this hive, combining them with paper.

10th Day:

Make the first cell-builder ready to receive the hatching larvae and prepare another. Put a one-third sheet of foundation into the second cell-builder, to be drawn out.

In the afternoon place a drawn one-third sheet of foundation in the breeder, remove the hatching larvae, cut the strips, then place the strips containing larvae on the cell bars and put into the first cell-builder.

When the programme has passed the initial stage the typical day should be as follows:—

(1) Make up queen cages and check orders.
(2) Catch and cage queens and post. If not enough orders place in a queen bank. Make sure that there are enough nucleus hives to take the cells.
(3) Raise above a queen excluder, the brood and bees needed to reinforce a cell builder in eight days' time.
(4) Remove the ripe cells, and place out in the nucleus hives.
(5) Reorganise the cell builder, removing combs not containing brood. Change over the drawn one-third sheet of foundation for a new one, leaving gaps for the new cells, and shift the cells just being capped to one side.

Jay Smith cell builder hive (right). The two middle frames contain the cell bars. Outside them are one-third sheets of foundation being drawn out for the breeder. Next to it is a recently-strengthened open starter hive

(6) Remove the freshly laid eggs from the breeder queen and place on the other side of the partition, shifting the other frames (containing one-third sheets with eggs) away, after making room by removing the newly hatched young larvae.

(7) Cut the strips of young larvae and mount them on the cell-bars. Kill enough larvae to make sure the cells will be spaced well apart, about 15 to the bar, three bars to the frame and two frames of bars.

(8) Place in the cell-builder.

(9) Combine a deck of brood and bees onto the cell-builder, using paper.

(10) Fill all feed bottles.

NUCLEUS HIVES

NUCLEUS hives are small hives designed to carry enough bees to care for a queen until she is mated, and to act as a storage place for young queens.

They vary in size from a small miniature size which takes three half-length half-depth type frames to a nucleus holding five standard frames.

Stocking the Nuclei

Miniature Nuclei: These can be stocked by the orthodox method of finding the queen in a hive, then confining her above a queen excluder in a standard hive super fitted to take the small (nucleus size) frames. These frames can then be lifted out, giving each baby nucleus hive one or two frames of brood and one or two frames of honey covered with bees.

There is a danger in confining the queen to the small frames, that the bees will abandon her and raise queen-cells amongst the brood in the full size frames.

A second method is to place the small frames in the miniature hive with a pint of bees. The bees are shaken through a queen excluder and then sprinkled with enough thin syrup so they cannot fly. They can then be ladled into the baby nucleus.

Nucleus Hives Containing Standard Frames:

Methods used are:—

(1) Finding the queen in a hive then making up the nucleus with brood and honey from the hive.

(2) Bringing up most of the brood in a hive above a queen excluder. When the brood is covered with bees next day, the nucleus is made up with brood and honey.

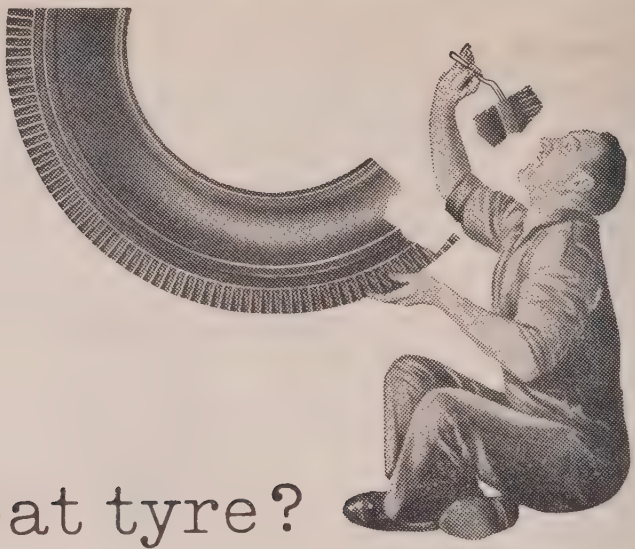
(3) The hive to be used is spun around on one corner to face the other way, then opened and the frames selected for the nucleus hive, the bees being shaken off back into the hive. The nucleus hive containing frames of brood and honey, but no bees, is placed with its entrance in the same position as the entrance of the hive before it was shifted. This must be done in the morning and the disturbed bees and the foraging bees will stock the nucleus hive by the next morning.

With any of the methods, to retain the bees in the nucleus hive if it is shifted away from the position the bees know as home, it must be shut up for two days before the bees are allowed to fly, or shifted more than two miles away from the apiary the bees regard as home.

CAGING THE QUEEN

Catching the queen can be done either by running her into a queen catching cage or by holding the hand as a funnel or picking up the queen by her wings and placing her in the cage.

With the queen should be as many workers, taken off a brood comb, as the cage will comfortably hold; the usual number is between eight and 12. These are picked up by their wings as they walk or drink honey on the comb.



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THE CONTROL OF GRASSES WITH CHEMICALS

By G. R. W. MEADLY, M.Sc., Officer in Charge, Weeds and Seeds Branch

GRASSES are among man's greatest assets and usually he tries to encourage their growth. The cereals, rice and many other grasses supply him with basic items of food and they are also important components of pastures which provide grazing for sheep and cattle.

There are occasions, however, when undesirable species cause concern, or even species which are normally desirable become troublesome by growing out of place.

With most weed problems, cultivation is the first line of attack, and this applies in the case of grasses. There are many conditions, however, when cultural methods are not practicable and chemicals can be used to advantage. We sometimes read about "chemical farming" in countries such as New Zealand, where chemicals are used to alter the composition of pastures, particularly to reduce the content of grasses. This technique has not been employed to any extent in Western Australia but chemicals are helping to control grass weeds in a number of ways.

In Orchards

In orchards and vineyards, weeds generally can be handled between the rows of trees by ploughing or rotary hoeing, but these operations leave a small square around each tree. The removal of perennial grasses such as couch and kikuyu from these squares by hand digging is a tedious and recurring job. Fortunately, a chemical developed in recent years has come to our assistance. It is known under a variety of trade names including Dalapon, Dowpon, Graypon and Terrapon. Unlike T.C.A. (sodium trichloracetate), it is relatively safe to use in the vicinity of vines and orchard trees.

Dalapon should be sprayed onto the foliage, as it is absorbed through the leaves rather than the roots. The usual rate of application for perennial grasses, such as couch in orchards, is ten pounds an acre actually sprayed. For best results this should be followed by a similar treatment two or three weeks later.

Providing the trees are healthy and not less than three years old, there is little risk of causing injury, although care should be taken to prevent the spray from drifting onto the foliage. Dalapon acts slowly and maximum effects may not become apparent for several weeks.

Irrigation Channels

Several chemicals are being used, particularly in Europe, for the control of wild oats in cereals. The treatment is relatively

costly, however, and so far chemicals have not been used in Western Australia against grasses growing with cereals.

Dalapon, T.C.A., and C.M.U., one of the urea derivatives, have a place in suppressing the growth of grasses along irrigation channels and, together with contact herbicides including sodium chlorate, borates and diquot, are applied around farm buildings. Under some circumstances they can be used to advantage for reducing the fire hazard. The contact herbicides cause a more rapid drying effect than Dalapon, T.C.A. and C.M.U. and are capable of killing annual grasses, but are less effective against perennial species.

Weeds, including annual grasses, growing in onions have been controlled with chloro I.P.C. There is a relatively fine distinction, however, between satisfactory weed control and damage to the crop, calling for considerable care in use.

Crab Grass

At this time of the year most home gardeners are viewing with concern the appearance of crab grass, both in garden beds and lawns. A vigorous, well covered lawn is one of the best safeguards against excessive invasion by this aggressive summer weed and autumn applications of fertiliser pay dividends by stimulating early growth of the sward grasses.

Many chemicals, including arsenicals, potassium cyanate and phenyl mercury acetate, have been tried with partial success, but the selective removal of a grass from a grass is not a simple assignment. The most satisfactory material so far tried is D.S.M.A., an abbreviation for disodium methyl arsenate. This is available under a number of different trade names and should be applied when the crab grass plants are still small. Several applications may be required during the summer to cope with a succession of germinations.

With all weed problems, first consideration should be given to cultural methods, but chemicals can also play their part in the conflict with undesirable grasses.

POST DIPPING LAMENESS IN SHEEP

By I. J. MILLER, B.V.Sc., Veterinary Officer

LAMENESS can be a most distressing feature at any time of the year, but when it coincides with the early onset of hot weather and fall-off in nutritive level of the feed, results may have a far reaching effect on the flock.

Survival through the summer largely depends on the sheep holding their condition for as long as possible. Nothing is more detrimental to this than the immobility associated with lameness. Not only does it affect ability to seek food and water, but infection has toxic side effects on appetite and general well-being.

This applies mainly to weaners, which are more susceptible to ill thrift than are older sheep; younger animals are also more likely to pick up infections at dipping.

Among the commonest of the diseases which cause lameness in sheep are arthritic infections of the joints, associated with lamb marking and other operations involving a break in the skin.

Erysipelas infection after dipping is an important aspect of this. The erysipelas organism is probably better known as causing swine erysipelas in pigs.

The fact that most routine dipping is carried out off-shears provides entry for bacteria through superficial cuts and injuries which occur at that time. This is so even after such cuts have apparently healed. The erysipelas bacteria live and multiply in non bactericidal dips which have been left standing for some time after being contaminated.

Symptoms:

The first sign of infection is usually seen three to four days after dipping has been completed, with affected sheep showing lameness in one or more legs, disinclination to move and progressive loss of condition. The region most commonly involved is the lower shank, downwards to the coronet and heels. The skin may show some reddening and swelling of the area and is usually hot and tender to the touch. The duration of the inflammatory period and lameness varies from 10 to 14 days, but in some cases more seriously affected animals may still show symptoms at four to six weeks. Other sheep, although exhibiting no observable lameness, may suffer a period of poor appetite associated with a brief rise in temperature.

Post dipping infections are rarely fatal, although the temporary set-back and loss of condition may prove costly as the summer progresses.

The sheep most likely to be involved are those put through late, after the fouled up dip has been allowed to stand for from 12 to 24 hours.

Control:

The erysipelas organism is sensitive to penicillin, and the injection of this antibiotic should be effective against the infection; however, many cases are too far advanced when recognised, for treatment to be of much value.

The accepted form of control is to incorporate a small amount of copper sulphate in the dipping fluid, to inhibit bacterial growth. From 2½ to 3 lb. of bluestone dissolved in one gallon of water and added to the dip at the rate of two pints a 100 gallons is sufficient for preventive purposes.

The recent trend towards shower dipping should also reduce the incidence of post-dipping lameness, although, if the reservior is allowed to stand for any length of time, this too could become a source of infection.

Where arsenical dips are used, some confusion could arise between a post-dipping infection and arsenical scald. They can be distinguished because arsenical scald invariably has a wider area of effect, with general reddening of the body surfaces, and in most cases is accompanied by other signs of arsenical poisoning.

LAMBING PROBLEMS IN SUMMER RAINFALL AREAS

By H. SUIJDENDORP, B.Sc. (Agric.), North-West Regional Adviser

LOW lambing percentages have become a serious problem in the summer rainfall areas in the North-West of Western Australia. Largely as a result of poor nutrition of the lambing ewes, lamb marking figures have fallen to the stage where keeping up stock numbers is extremely difficult.

Lambing performance in the summer rainfall areas involves a completely different set of conditions to those of the rest of the State. The seasonal conditions, which in turn determine the nutritional value of the natural grazing, exert a strong influence on the breeding performance of the ewe. It is therefore necessary to try to time mating to fit in with seasonal conditions if the ewe is to have her best chance of producing a healthy lamb.

In Western Australia the area of predominantly summer rainfall is roughly confined to north of the Hammersley Ranges. The average wet season breaks some time in January, although there may be local storms, especially inland, as early as November.

The growing season extends into March-April and may be prolonged for several months by small amounts of winter rain. Depending on the season, reasonable quality ground feed will be available up to April-May.

In most seasons, even perennial native grasses lose most of their feeding value when they dry off at the end of the rainy season. If protein-rich topfeed is present, this prolongs the period during which high quality fodder is available, but where topfeed is absent or has been over-grazed so that it is out of reach for grazing animals,

the period of adequate nutrition is quite limited.

To satisfy the nutritional requirements of the ewe, it is therefore necessary to time the lamb drop to fit in with the short period of adequate nutrition for ewes and lambs.

This was shown very clearly by a lambing trial at our research station about 100 miles inland from Port Hedland. Last summer the wet season was very short, and useful rain was spread over only about six weeks, ending in early March. Consequently, even in May feed was drying off.

As a result, lamb mortality after birth was high but was lower for the April-May drop (27 per cent.) than for the June-July drop (36 per cent.). Daily weight gains showed tremendous differences with 0.42 lb. per day for the early drop and 0.24 lb. per day for the late one.

Poor nutrition in the early life of the lamb affects future wool production, so a two month variation in time of lambing may have far reaching effects.

How does all this fit into normal station management?

A November mating would fit in with a summer deferment of the better class country. This means that during the early part of the wet, sheep are kept on hard vegetation, and are returned to the better vegetation about six weeks later. These plants have then had a chance to get established and set seed before being subjected to grazing. This will improve the plane of nutrition during a period of very high requirement and give the animals a better chance.

Reasonably good conceptions can therefore be expected from November mating, while earlier mating dates are a bit doubtful. Later mating is likely to produce lambs at a time when the plane of nutrition is declining, often with disastrous results.

Fitting in a shearing date may be more of a problem.

Usually shearing teams start the season in April in Kimberley, then move south and usually disband in July when shearing is in full swing in the farming areas. This makes May-June the most popular time for shearing in the region under discussion.

Obviously this clashes with the best time for lambing from every other point of view. Now that lambing percentages are so low that breeding up after the ravages of cyclone and flood is virtually impossible, some adjustment in the seasonal timetable will have to be made, to make sure that the best use is made of the native vegetation still available for grazing.

FLY CONTROL ON COMMERCIAL POULTRY FARMS

By P. SMETANA, B.Sc. (Agric.), Acting Officer in Charge, Poultry Branch

POULTRY attract flies, and unless they are managed correctly, poultry runs can become dangerous breeding grounds for these pests.

Backyard poultry units are the major cause of complaints concerning flies, probably due to the fact that they are in more heavily populated areas. Conditions in backyard units and commercial farms are often quite different, and this article deals with aspects of fly control on the larger poultry farms.

The common housefly is well known in the adult winged form. A single fly may lay from five to 20 batches of eggs, each batch containing 75 to 150 eggs. These take from eight to 24 hours to hatch into small white maggots which develop into the pupal stage. The time interval between successive generations is about three weeks.

The lesser housefly can also become a pest on poultry farms. This fly is smaller and lighter in colour than the ordinary housefly, and has a characteristic hovering motion in flight. It has a brown, hairy maggot which is more difficult to detect than that of the common housefly, so that rapid breeding often takes place without being noticed. Also it prefers cool conditions and is most prevalent in winter and

spring, while the common housefly is more of a problem during warmer weather.

Sanitation

Proper sanitation is the most important aspect of fly control, and this is particularly important on poultry farms where there are many opportunities for large scale fly breeding under careless management conditions.

Although the harmful effects of flies to the birds themselves are not great the danger to human health is very real and most poultry farmers fully appreciate this fact. As a result, satisfactory sanitation programmes are in force on most farms but it is as well to check the following points to ensure that fly breeding is completely eliminated.

Moist poultry manure is one of the best breeding grounds for flies. Most modern poultry farms operate under the deep litter system and as long as the litter is kept dry and within the confines of the shed housing the birds, there is little opportunity for fly breeding. Any type of litter is a potential breeding ground, irrespective of age, when it becomes damp.

Fly breeding usually takes place on litter once it is removed from the presence of birds, which act as a type of biological control. Most breeding on commercial farms occurs where manure is used to fertilise the greenfeed plot. The use of sprinklers increases the danger by keeping the manure moist. Where litter or droppings are applied to greenfeed they should be spread sparingly and well watered in immediately after application.

Another common cause of breeding is the escape of litter, even in small amounts, outside the shed, where the birds cannot reach it. Birds often scratch some litter outside the shed, and once this becomes damp it is an ideal breeding ground. Provision should be made to prevent litter from escaping from the poultry shed.

Fly breeding is more likely to be a problem under semi-intensive conditions or cage units than in the large intensive deep litter unit. Feed wastage from external feeders, particularly in winter, can easily result in breeding. Attention should also be given to external watering devices to ensure that spillage is reduced to a minimum.

A deplorable practice which can have disastrous affects from a general disease point of view as well as adding to the fly problem is the inadequate disposal of the carcasses of dead birds. In some cases these are left lying in the poultry run, or thrown outside the yard and left there to rot. All dead birds should be carefully disposed of immediately.

Careful management is necessary in cage units to overcome the fly problem. The important factor is to avoid breeding in the droppings underneath the cages, which means that rapid drying must take place. Protection against dampness both from rain and spillage from water troughs is essential.

The cages should be set up in such a manner that the droppings build up into a dry cone structure. Under normal conditions this will prevent fly breeding but at times it may be necessary to apply an insecticide. Overseas poultry farmers report success with the weekly dusting of the droppings with gypsum.

Insecticidal Treatment

Even under the best of housing conditions, where no fly breeding is allowed, a certain concentration of flies will be present on poultry farms.

Most farmers combine a policy of sanitation with some form of insecticidal treatment in order to keep fly numbers down to a minimum. A number of modern insecticides have proved very effective in the control of the common housefly; those most commonly used in Western Australia include Dipterex, Diazinon, Malathion, Dieldrin, Baytex, Rogor, DDT and Lindane.

Caution should be used when applying these insecticides near the birds, as they may have harmful effects. This is particularly important in the case of Baytex, Dieldrin and Diazinon.

Whenever spraying is carried out inside the shed, direct contact with the birds' feed or water should be avoided.

Inside the poultry shed it is not possible to use baits, and the use of residual sprays on the walls and floors is necessary. It has been found that all insecticides have a longer residual action when applied with sugar. The residual period is greatly reduced in sunny, exposed positions.

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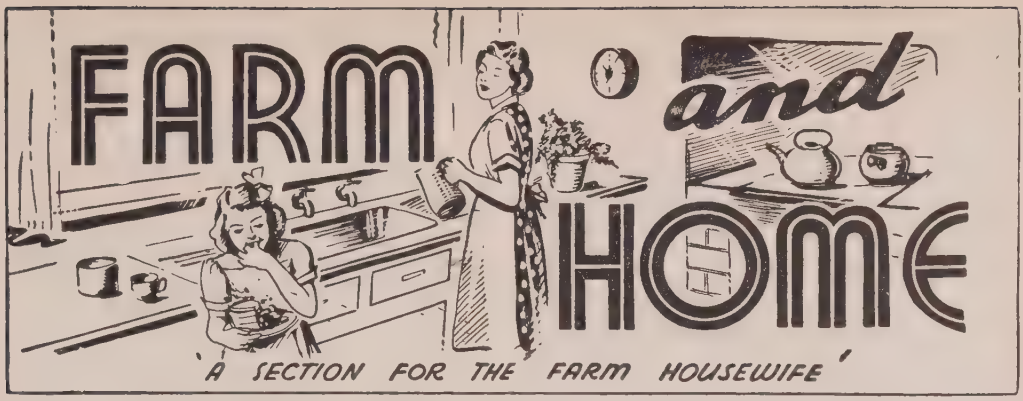

Festive Fare

"BRING A PLATE"

By HELEN M. GLOSTER

CHRISTMAS is the season for parties and party fare. Most housewives will have a busy time from now until well after Christmas Day itself. There will be heavy demands for supplying the inevitable "plate" for party or social.

There will be parents' days, and break-up school parties. Every sporting and social club in the district will have a function to wind up the season, or round off the year's activities. All these are likely to require "a plate."

The housewife will also be faced with home entertaining, and she may sometimes be at a loss to know how to cope with it all. When she is confronted with a particularly busy week, her best plan is to make a large butter cake which will keep well. This may be baked in one large slab using a baking tin, or in several smaller rectangular cake tins. Pieces may be cut from the cake, and finished off in a variety of ways, with changes in icing, filling, flavouring, and decoration. Two foundation recipes are given.

If you wish the cake to keep for a week or longer, the first or richer cake mixture is recommended, as the larger proportion of fat keeps the cake moist.

For a cake which will be used fairly quickly, the plainer or cheaper recipe is quite satisfactory.

BUTTER CAKE No. 1

Ingredients:

1 cup butter (or substitute fat).
1½ cups castor sugar.
4 eggs.
3 cups self raising flour.
1 cup milk.
1 teaspoon vanilla essence.

Method:

1. Line the tin with greased paper, or grease the tin well. If the tin is greased, a layer of greased paper in the bottom of the tin makes removal easier after cooking.
2. Cream the fat and the sugar until the grain has disappeared from the sugar. Essence may be added before the creaming.
3. Beat eggs, then add gradually to the creamed fat and sugar, beating well between each addition.
4. Sift in the flour.
5. Add milk, fold all ingredients together, carefully, until evenly mixed.
6. Turn into greased tin and bake in a moderate oven about 1 hour.

Temperature of oven 325° to 350° F.

BUTTER CAKE No. 2

Ingredients:

½ cup butter of substitute fat.
1 cup castor sugar.
2 eggs.
3 cups plain flour.
4 level teaspoons cream of tartar.
2 level teaspoons bicarbonate of soda.
Pinch salt.
1 cup milk.
1 teaspoon vanilla essence.

Method:

1. Make by the creaming method as in recipe No. 1.
2. Cool thoroughly before storing. Keep in an air tight tin until required.

Cake may be iced the next day or pieces cut off, filled and iced from day to day as required.

If required for lamingtons, cake should be kept for two days. Fresh cake breaks easily and is difficult to handle, when icing lamingtons.

With a little ingenuity that one large slab of cake can be turned into quite an assortment of cakes, both large and small.

Icings may be varied in colouring and flavouring, white, pink or chocolate. There are other delicious flavourings besides vanilla. Rosewater, lemon, orange-flower water, almonds are all delicate in flavour. If you have a strawberry patch, crushed strawberries are delicious in both icings and fillings. Passion fruit juice or other juices may also be added as flavouring.

An iced slab cake may be split and spread with:—

Whipped cream, sweetened and flavoured.

Mock cream.

Jam.

Lemon cheese.

The filling and perhaps the icing too is best done soon before the cake is to be eaten.

LAMINGTONS

Stale cake is cut into neat cubes or rectangles. Do not make these cakes too large.

There are two types of chocolate icing that may be used. The second, a chocolate sauce, is not suitable if lamingtons are to be stored for some days, as it will mould.

Ice the cakes then coat with desiccated coconut.

CHOCOLATE ICING No. 1

Ingredients:

1 cup icing sugar.
1 to 2 tablespoons milk or water.
1 level tablespoon cooking chocolate, or
2 level tablespoons cocoa.
1 teaspoon butter or copha.
Vanilla.

Method:

1. Melt butter or copha in milk or water, add cocoa, bring to boil and cook for several minutes.
2. Partly cool mixture, then add icing sugar.
3. Beat well.

ICING No. 2
CHOCOLATE SAUCE COATING FOR LAMINGTONS

Ingredients:

1 cup water or milk and water.
1 level tablespoon cornflour.
1 level tablespoon cocoa or cooking chocolate.
1 level tablespoon sugar.
Vanilla essence.

Method:

1. Blend the cornflour and cocoa to a smooth paste using some of the measured liquid.
2. Heat remainder of liquid and stir into blended mixture.
3. Return mixture to saucepan, stir until it boils and boil for 5 minutes stirring all the time.
4. Remove from stove add sugar and vanilla.
5. Cool mixture before using.

To Coat:

1. Place a piece of cake on a fork dip quickly in and out of the sauce, then spread sauce evenly using a knife or spatula.
2. Have ready a plastic bag containing coconut.

3. Place cake into the bag and shake gently until coated with coconut.

4. Lift lamington out and press carefully into shape using a flat knife or spatula.

VARIATIONS

1. Split the cake spread with raspberry jam in the centre before making up the lamingtons.

2. Cut a piece from the top of each lamington and place a teaspoonful of whipped cream inside each, then replace the top at an angle with the cream showing.

3. **Lamington Block.**—Make a slab of cake into one large lamington to be cut up at the supper table. This cake could be decorated with crystallised cherries for special occasions.

4. **Cream Cake.**—Take a piece of butter sponge, split, and fill with mock cream.

Ice and decorate.

5. **Strawberry Cream Cake.**—Spit a piece of butter sponge.

Make a filling with whipped cream to which has been added crushed strawberries and a little icing sugar.

Ice and decorate with fresh strawberries.

MERINGUES

In answer to a reader's request a recipe for meringues has been included in our "festive fare" recipes. Meringues keep well for a considerable time if stored in an *air-tight tin.* They are always popular at parties and for special occasions may be filled at the last minute with whipped cream which has been sweetened and flavoured with vanilla, a few crushed strawberries, or passion fruit pulp.

Here is the recipe:—

Ingredients:

3 egg whites.

Pinch salt.

9 oz. castor sugar.

Sufficient cream of tartar to cover a sixpence, or

½ teaspoon lemon juice.

Flavouring.

Method:

1. Slightly grease a sheet of greaseproof paper, and place in readiness on a slab of wood ¾ in. thick or on a baking tray.

2. Take a large basin, making sure it is perfectly clean and dry. The slightest trace of grease from the paper greasing operations, will prevent the frothing of the eggs.

3. Place eggs and salt in basin and whisk until stiff. Test by turning the basin upside-down. If the mixture does not move in the basin it is ready for the addition of the sugar. *Whisking beyond this stage will result in close, heavy meringues.*

4. Sieve in the sugar, a little at a time and mix in gently and lightly with a metal spoon. Beat until stiff.

5. Lightly fold in the essence and cream of tartar or lemon juice.

6. Put in neat dessert-spoonful heaps on the greased paper, using a wet spoon. Place meringues apart.

Alternatively, run the mixture through a forcing bag with ½ in. nozzle, using a circular movement and piling meringue high. Use a wet knife to cut off the mixture from the forcing bag.

7. Place in a *very slow* oven to dry out and cook at least two hours.

If cooking in a wood stove it is best to put the meringues in the oven when fire is very low and going out. If made in the evening they may be left all night in the oven. Meringues when cooked should be crisp and dry and faintly tinged.

Temperature in gas or electric oven is 200° F., or very low if there is no thermostat.

Variations:

Meringues may be:—

1. Pinked slightly, with a little cochineal or carmine colouring added to the meringue before cooking.

2. Lightly sprinkled with castor sugar before cooking.

3. Sprinkled with non-pariels (hundreds and thousands) before cooking.

4. Joined with whipped cream mixture as suggested earlier.

5. Served with icecream, meringues make a delicious sweet dish for summer dinners.

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2529 The Use of Copper and Zinc in the Cereal-Growing Districts of W.A.—Mar., 1958.
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2927 Weed Control in Cereals—Aerial Spraying Trials—Sep., 1961.
2949 Recommended Wheat Varieties, 1962—Nov., 1961.

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2013 Farm Fencing Hints—Sep., 1952.
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2095 Fighting the Argentine Ant—Sep., 1953.
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2125 Water for Agricultural Purposes—May, 1954; July, 1954.
2177 Treating Hard Water—July, 1954.
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2865 Potatoes Sprinkler Irrigated from the Collie River—Mar., 1961.

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2285 Agriculture Concerns You—Oct., 1955.
2290 Strychnine Poisoning in Dogs—Sept., 1955.
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2466 Tractors Can Kill—July, 1957.
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2641 Kikuyu Renovation Points for Tyne Cultivators—May, 1959.
2653 This Elusive Thing Called Horsepower—July, 1959.
2667 Dosing Farm Animals—Sept., 1959.
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2818 Facts and Figures—Nov., 1960.
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2866 Chemical Poisoning in Animals—Arsenic—Mar., 1961.
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2891 Chemical Poisoning in Animals—Lead—May, 1961.
2907 Chemical Poisoning—Prussic acid—July, 1961.
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2356 Pastoral Research—May, 1956.
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2720 Safflower—An Oil Crop for the Kimberleys—Feb., 1960.
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2759 Studies in the Mulga Pastoral Zone—1. The Grazing of Wandarrie Grass Associations—June, 1960.
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2912 Rice Growing in the Ord River Valley—Aug., 1961.
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2609 Flax as Rotation Crop in Higher Rainfall Areas in Western Australia—Jan., 1959.
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2892 Stocking Rate and Pasture Management—May, 1961.

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2109 Castration of Calves and Pigs—Jan., 1954.
2182 Suppurative Otitis in Pigs—Jan., 1953.
2200 The De Tusking of Boars—Dec., 1954.
2312 Lice on Pigs—Jan., 1956.
2326 Reduce That Pig Mortality—Feb., 1956.
2508 Diseases of the Farrowing Sow—Jan., 1958.
2538 Profitable Pig-Feeding—Importance of Protein—May, 1958.
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2583 Infectious Pneumonia of Pigs—Nov., 1958.
2619 Rearing Orphan Animals—Mar., 1959.
2626 Round Farrowing House Reduces Piglet Losses—Jan., 1959.
2672 Vitamin A Deficiency in Pigs—Sept., 1959.
2712 Pig-Pox—Feb., 1960.
2728 Feeding Pickled Wheat to Pigs—Mar., 1960.
2734 The Care of the Breeding Sow—Apl., 1960.
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2852 Baconer Carcass Competitions—Feb., 1961.
2863 Points on Producing Better Pigs—Mar., 1961.
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2921 The Open Range System of Pig Raising—Sept., 1961.
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2155 Cereal Smut Diseases and Their Control—May, 1954.
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2288 White Wax Scale—Sept., 1955.
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2510 Bacterial Canker of Stone Fruits—Jan., 1958.
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2589 Cover Spraying for the Control of Celery Leaf Spot—Nov., 1958.
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2652 Plant Specimens for Identification—July, 1959.
2648 Crown Gall of Fruit Trees and Other Plants—Jan., 1953.
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2740 Mosaic Disease of Cucumbers—A New Resistant Variety—Apl., 1960.
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2775 What's Wrong with That Plant—July, 1960.
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2815 Leaf Scorching—Nov., 1960.
2816 Geranium Rust—Nov., 1960.
2832 Scald of Barley—Dec., 1960.
2840 Sclerotinia Rot of Vegetables—Jan., 1961.
2857 Control of Damping Off in Seed Beds—Feb., 1961.
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2875 Bare Patch and Poor Emergence of Cereals—2—Depth of Planting—Apl., 1961.
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2876 Powdery Mildew of Ornamentals—Apl., 1961.
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2901 Citrus Psorosis—June, 1961.
2902 Net Blotch of Barley—July, 1961.
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2940 Common Bean Mosaic—Oct., 1961.
2941 Plant Diseases in Western Australia—Oct., 1961.
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2025 Thin Shelled Eggs—Jan., 1953.
2120 Deep Litter for Poultry—Part 1—Jan., 1954.
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2157 Rearing of Chickens—Sept., 1947.
2168 Coccidiosis of Fowls—July, 1954, June, 1950.
2190 Infectious Sinusitis of Turkeys—Sept., 1954.
2232 Leucosis in Fowls—Jan., 1955.
2237 Producing Poultry Meat for Profit—Mar., 1955, Jan., 1956.
2265 Poultry Sanitation—May, 1955.
2283 Fowl Pox—July, 1955.
2287 Geese—Notes on Feeding, Breeding and Management—Sept., 1955.
2338 Management and Diseases of Cage Birds—Mar., 1956.

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2539 Selecting and Preparing Table Poultry—May, 1958.
2575 The Use of Rock Phosphate from Christmas Island in Poultry Rations—Sept., 1958.
2629 Incubator Hygiene—May, 1952.
2633 The Place of Clover Meal in Poultry Feeding—May, 1959.
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2729 Better Rations for Broiler Production—Mar., 1960.
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2847 Third West. Australian Random Sample Egg Laying Test—Feb., 1961.
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2860 Worms in Poultry—Mar., 1961.
2903 Poultry Diseases in W.A.—July, 1961.
2906 Feeding for Egg Yolk Colour—July, 1961.
2919 Automatic Waterers for Day Old Chickens—Sept., 1961.
2922 Pullorum Tested Poultry Flocks, 1961—Sept., 1961.

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2099 Footrot in Sheep—Nov., 1953.
2143 Sheep Blowfly Problem—Nov., 1954.
2186 Farm Butchering—Sept., 1954.
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2228 Clover Disease—Jan., 1955.
2233 Lice and Tick in Sheep—Jan., 1955.
2253 Vaccines and Vaccination—Mar., 1955.
2307 Paratyphoid (Salmonellosis) in Sheep—Nov., 1955.
2328 The Sheep Itch Mite—Mar., 1956.
2330 Caseous Lymphadenitis (Cheesy Gland) of Sheep—Mar., 1956.
2340 Lucerne and Banana Trash for Sheep Feeding—Mar., 1956.
2359 Arthtritis in Lambs—May, 1956.
2364 Urinary Calculi of Sheep in W.A.—Sept., 1956.
2385 "Clover Disease" of Sheep in W.A.—Sept. 1956.
2394 Blowfly Strike—Nov., 1956.
2406 Cystic Tapeworms—Nov., 1956.
2407 Stock Disease Control by Correspondence—Nov., 1956.
2409 Sheep Shearing Technique—Jan., 1957.
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2432 Fat Lamb Production—Mar., 1957.
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2445 Glycerine for Pregnancy Toxaemia—May, 1957.
2446 Photosensitisation—May, 1957.
2459 Vitamin A Supplements for Sheep and Cattle—July, 1957.
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2468 Hypocalcaemia in Breeding Ewes (Milk Fever, Grass Tetany)—Sept., 1957.
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2570 Sheep Nasal Bot—Sept., 1958.
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2611 Minerals Supplements for Stock in Pastoral Areas—Jan., 1959.
2619 Rearing Orphan Animals—Mar., 1959.
2645 Cull the Low Producers—May, 1959.
2650 Cobalt Deficiency in Sheep and Cattle (Cobalt Bullets)—July, 1959.
2651 Diseases Following Upon Lamb-Marking—July, 1959.
2671 Progress in the Eradication of Footrot—Sept., 1959.
2682 Copper and Cobalt Deficiency of Livestock in W.A.
2696 Coccidiosis in Sheep—Nov., 1959.
2703 Famous Sheep Breeds—The Merino—Jan., 1960.
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2713 Famous Sheep Breeds—The Corriedale Sheep—Feb., 1960.
2715 Autumn v. Spring Shearing—Feb., 1960.
2721 Shearing Shed Design—Mar., 1960.
2723 Famous Sheep Breeds—The Leicester—Mar., 1960.
2736 Famous Sheep Breeds—The Border Leicester—Apl., 1960.
2747 Time of Lambing—May, 1960.
2758 Autumn Lambing Means Autumn Feeding—June, 1960.
2762 Famous Sheep Breeds—The Romney Marsh—June, 1960.
2769 A Survey of the Incidence of Lupinosis in Sheep—July, 1960.
2773 Lamb Marking—July, 1960.
2777 Help Those Lambs to Live—July, 1960.
2782 Famous Sheep Breeds—The Southdown—Aug., 1960.
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2826 Teaser (Vasectomised) Rams—A Management Advantage—Dec., 1960.
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2864 Time of Lambing Experiment—Mar., 1961.
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2894 White Muscle Disease of Sheep—June, 1961.
2913 A Calendar of Farming Operations for Cereal and Sheep Areas of W.A.—Aug. 1961.
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2955 Selecting and Culling Sheep Flocks—Dec., 1961.

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PEDIGREE SEED FOR 1962

By J. REEVES, Plant Breeder

If a farmer requires true to type seed with a minimum of impurities he should buy pedigree seed regularly from the Department of Agriculture. This is raised on agricultural research stations located throughout the wheatbelt.

Each variety is re-selected annually to ensure it is breeding true to type and extreme care is exercised to ensure that it is as free as possible from admixture during the years it is grown in stud and bulk plots.

Wheat varieties sold as pedigree seed are those recommended by the State Wheat Advisory Committee. The oats and barleys are those at present recommended by the Department of Agriculture. These represent the pick of the varieties currently available, giving suitable combinations of yield and grain quality.

The most important features to the farmer are high yielding ability and good field characters, but these must be combined with satisfactory qualities to enable the grain to be readily sold, both on the local and overseas markets. It is quite unrealistic to consider only yielding ability when determining if a new variety is to be placed on the recommended list.

The six wheat varieties recommended for general sowing by the State Wheat Advisory Committee are Bencubbin, Bungulla, Eureka, Gabo, Kondut and Wongoondy.

Detailed planting recommendations for these are given in Bulletin 2949.

The Department is recommending four oats, the midseason maturing Avon and Dale and the early maturing Ballidu and Kent. Only Ballidu and Kent are recommended in low rainfall districts. In all other areas Avon and Dale should be sown early, followed by late sowings of Ballidu and Kent. Ballidu produces a type of grain most suitable for our overseas markets. Avon and Dale also produce grain suitable for this purpose, provided their bushel weights are satisfactory. Kent is a grazing oat, most suitable for feeding off, but it can produce grain with a high bushel weight.

The two recommended barleys are Beecher (6-row) and Prior (2-row). Beecher is used within the State for feeding purposes, either as green feed during winter or as a grain supplement over the summer period. A high proportion of the grain is also sold overseas. Prior is a malting type barley and provided it is a satisfactory sample the grain is purchased locally by maltsters. Both varieties are early maturing and therefore should not be planted too early in the season; if they are, the grain may be heavily stained, which reduces its market value.

How often pedigree seed should be purchased, depends on how quickly the farmer's crop becomes mixed. Normally the introduction of fresh seed every four or five years is sufficient. Contrary to popular belief, cereal seed does not degenerate if it is kept free from admixture and free from disease. If lower yields are obtained, the reasons are elsewhere. Seasonal conditions and losses of soil fertility are two of the most obvious causes.